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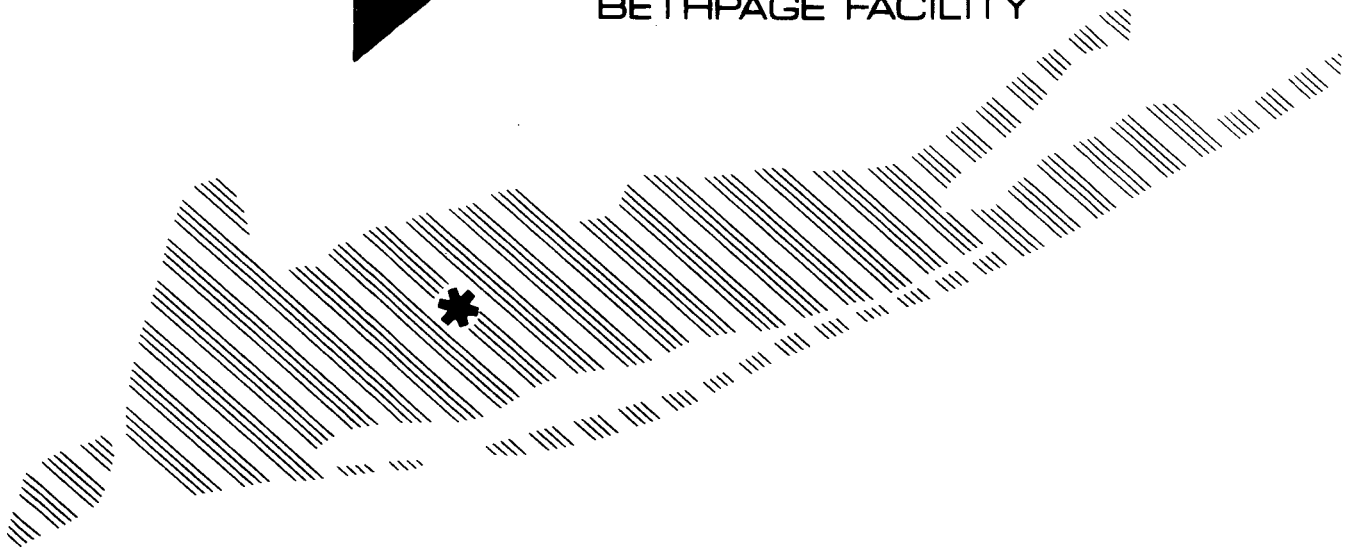
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY



HAZARDOUS WASTE REDUCTION PLAN

BETHPAGE FACILITY
BETHPAGE, NEW YORK

Dvirka and Bartilucci

Consulting Engineers

JULY 1991

HAZARDOUS WASTE REDUCTION PLAN
FOR
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
BETHPAGE, NEW YORK

SUBMITTED TO

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS SUBSTANCES REGULATION
BUREAU OF POLLUTION PREVENTION
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GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN
VOLUME I

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Section 1

1.0 INTRODUCTION

1.1 Purpose

In August of 1990, the New York State Legislature passed the "Hazardous Waste Reduction Act" into law (Chapter 831 of the Laws of 1990). Among other provisions, the legislation requires that any facility that generated in excess of 1,000 tons of hazardous waste in 1990 or that is required to possess a Part 373 hazardous waste management permit must submit a Hazardous Waste Reduction Plan (HWRP) to the New York State Department of Environmental Conservation (NYSDEC) by July 1, 1991. The goal of this legislation is to reduce, to the maximum extent possible, the generation, accumulation, storage and potential release of hazardous waste and toxic substances into the environment. Pursuant to this legislation, in December 1990, NYSDEC issued a final supplemental guidance manual implementing the provisions of the law which requires the preparation of the HWRP, a biennial update of the HWRP and the submission of an annual status report regarding each facility's hazardous waste reduction program. Since the Grumman Aerospace Corporation (GAC) Bethpage facility generates more than 1,000 tons of hazardous waste per year and has filed a Part 373 Permit Application with the NYSDEC, it is required to submit a HWRP to the NYSDEC. This document constitutes the GAC Bethpage facility HWRP.

It should be noted that the Bethpage facility has been implementing waste minimization practices since the early 1970s. As will be presented, discussed and evaluated in greater detail throughout this HWRP, numerous waste minimization measures are already in place at the Bethpage facility. These waste reduction and recycling systems include improved housekeeping including an updated computerized tracking system for raw materials, segregation of various hazardous waste streams, counter current rinsing, ion exchange recovery, on-site wastewater treatment facilities, solvent recovery, silver recovery, high efficiency paint transfer, and vacuum deposition of cadmium among other measures. It is GAC's policy to identify, investigate and evaluate processes leading to the implementation of waste minimization measures which optimize its manufacturing and production facilities and provide for enhanced environmental protection.

1.2 Scope

In order to prepare this HWRP, GAC procured the services of the engineering firm of Dvirka & Bartilucci Consulting Engineers (D&B) to provide technical assistance with respect to

undertaking process audits, identifying waste reduction opportunities, preparing feasibility analyses and compiling the final report. To fulfill the technical requirements of this HWRP, the NYSDEC has issued a checklist of items to be included in each plan. Four separate tasks, each with subtasks, were utilized to implement this waste minimization study, as follows:

Phase I: Site Waste Reduction Overview

Task A - Hazardous Waste Stream Data Collection

- Subtask A-1 Preaudit Information Review
  (NYSDEC checklist items 1, 2, 3, and 4 [partial])
- Subtask A-2 Audit Process
  (NYSDEC checklist items 4 and 5)
- Subtask A-3 Postaudit Process and Development of Waste Index/Cost Estimate
  (NYSDEC checklist items 6, 7 and 18)

Task B - Development of Waste Reduction Techniques

- Subtask B-1 Preliminary Screening of Source Reduction Techniques
  (NYSDEC checklist items 8a, 8b, 8c, and 8d)
- Subtask B-2 Preliminary Screening of Reclamation/Recycling Techniques
  (NYSDEC checklist items 8e and 8f)

Phase II: Hazardous Waste Reduction Plan Preparation and Submittal

Task C - Selection of Final Waste Reduction Techniques.(Feasibility Analysis)

- Subtask C-1 Technical Evaluation of Selected Waste Reduction Options
  (NYSDEC checklist items 10 and 14)
- Subtask C-2 Cost Evaluation of Selected Waste Reduction Options
  (NYSDEC checklist items 9 and 10)
- Subtask C-3 Selection/Scheduling of Technically and Economically Feasible Waste Reduction Options
  (NYSDEC checklist items 12, 16, 17, and 19)

Task D - Development of Hazardous Waste Reduction Plan (HWRP)

- Subtask D-1 Preparation of Draft HWRP
  (NYSDEC checklist items - not applicable)
- Subtask D-2 Preparation of Final HWRP
  (NYSDEC checklist items - not applicable)

The following pages will present a description of the technical activities and requirements associated with the tasks and subtasks itemized above.

Task A - Hazardous Waste Stream Data Collection

The waste reduction audit or assessment was the cornerstone of the development of this waste minimization or hazardous waste reduction plan. The quality and scope of the investigation undertaken at this initial task can often determine the degree of success or failure of the overall waste reduction program. A significant portion of this task was involved in gathering and evaluating the information regarding production process operation at the Bethpage facility.

At this time, Dvirka & Bartilucci Consulting Engineers (D&B) has identified fifteen potential waste streams at the Bethpage Facility which are eligible for additional assessment and evaluation under the program. Based upon review of data which led to additional screening of this list, eight waste streams were actually evaluated for application of possible waste minimization efforts. D&B elected to break this task into three subtasks or components including preaudit information review, audit process and postaudit activities. Each of these subtasks are discussed below.

Subtask A-1 Preaudit Information Review

This first step in the waste reduction audit process was perhaps the most important in controlling the successful outcome of the development of this HWRP, particularly with respect to the extremely short time frame available for completing this project. The quality and completeness of the data evaluated by the consultant and provided by GAC personnel, determined the rate at which the project team proceeded through and documented the hazardous waste reduction evaluation process for each waste stream.

As part of the preaudit information review undertaken at the GAC, the following information was collected and reviewed.

- NYS Waste Reduction Guidance Manual and Supplement.
- USEPA Waste Minimization Opportunity Assessment Manual.
- In Senate version of the NYS law.
- Part 373 Permit Application - GAC Bethpage facility.
- Bethpage Facility Annual Generator Report for the year ending 1990.
- Manifest Data for the year 1990 for the Bethpage facility.

In addition to this information, data relative to the number and types of products and, if necessary, intermediate products processed at the Bethpage facility were investigated by GAC. Obviously, this information is critical in supporting the discussion and development of a hazardous waste production index.

Additional activities undertaken by the audit team in consultation with the Audit Team Manager included the following:

- Reviewed appropriate state guidance documents with members of audit team.
- Reviewed NYSDEC Hazardous Waste Reduction Audit Program facility questionnaires.
- Prepared copies of "clean" site plan for labeling in the field.
- Coordination between D&B and GAC technical coordinators to schedule activities of inspection (i.e., specific schedule, number of people involved, etc.) and review any site specific health and safety requirements.
- Met with appropriate GAC representative to review existing records/manifests/waste analyses by existing vendors prior to on-site audit.
- Identified major waste streams and likely sources from manifest and record review.
- Identified hazardous waste generation rates on a preliminary basis by manifest and record review.

Subtask A-2 Audit Process

This subtask addressed the initiation and completion of the actual hazardous waste reduction "audit" or "assessment" for fifteen waste streams at the facility.

Based on information acquired from GAC for each waste stream by the audit team, waste streams were selected and scheduled for conducting the actual audit. The audit team used the "Waste Reduction Questionnaire" provided in Appendix B to document each waste stream to be audited.

Much of the audit process was utilized to verify information obtained during Subtask A-1, discussed above.

The audit team initiated the audit process by meeting with specific process managers to review the operation at the facility and complete the information requirements outlined in the Waste Reduction Questionnaire.

Of paramount importance was the verification of the following information:

- The types and amount of each chemical input to the process.
- The type and amount of each waste produced and where it is produced within the process.
- The details of each process operation leading to the preparation of a schematic of the manufacturing operation.

Overall, six areas were addressed as part of the waste reduction questionnaire. These included:

- Background Information
- Labor Requirements
- Equipment Requirements
- Material Usage Information (including raw materials, water and energy use)
- Waste Generation
- Miscellaneous Operation Data (such as ongoing or unsuccessful past attempts at waste reduction).

Each process or operation "audited" or "assessed" was identified by a descriptive title. Basic identification information, such as the date of the audit, names of the auditors from both D&B and GAC and the dates of the audit process were recorded. Also, the name, title and phone numbers of all GAC process personnel were identified. This was particularly important for verification and/or clarifications of technical information required as a follow-up for completion of subsequent steps of the audit process discussed below.

Background Information - The audit team provided a brief description of both the overall facility or building complex along with the number, names and a brief description of the types of processes or operations generating hazardous waste within that particular complex. It was also most important for the audit team to begin to define the measure of production output for each manufacturing process, if possible. As part of this step in the audit process, a sketch or schematic

drawing was made of the process. Where applicable, drawings were obtained from plant personnel that provided the audit teams with the floor plans for certain of the buildings engaged in the manufacturing process. In order for a particular process/operation to be evaluated from a waste reduction perspective, it was necessary to require such details in some cases in order to assess the feasibility of optimizing a particular waste reduction option.

Labor Requirements - Along with the background information, the audit team identified the labor requirements for the particular process being assessed. In particular, this step assisted in identifying those operations which were run on a two or three shift basis. This aspect of the audit did not identify any variation in the type or quantity of waste generated by the various shifts.

Equipment Requirements - The purpose of this step in the audit process was to identify the degree of efficiency being achieved by various pieces of major equipment. This was typically done on a qualitative basis at this time by simply identifying equipment that has achieved or surpassed its design life and for which high efficiency replacement equipment may be available.

In addition to identifying the type and age of specific pieces of equipment, the audit team also addressed the equipment maintenance and cleaning requirements. This was particularly important when solvents were used to clean or maintain equipment and hazardous waste was generated as a result.

Materials Usage Information - In order to conduct the process mass balance and quantify the related efficiency of the system being evaluated, it was important to identify the raw material product being utilized as part of the operation. The audit team relied on information provided by GAC in this regard, particularly with respect to the chemical usage information.

Waste Generation - This aspect of the audit identified not only the type of waste generated, but also the point within the overall process where the particular waste was generated, the method of disposal and the cost of disposal. Along with this information, data was collected regarding the physical and chemical characteristics of the waste stream in question. This information is of particular importance, for instance, in utilizing a waste exchange concept or attempting to utilize a particular waste as an input to the development of another product. Additionally, information was provided to describe the method of storage of each waste stream identified.

Other Waste Reduction Information - This portion of the audit gathered information pertaining to the relative successful previous attempts at implementing specific waste reduction projects at each facility. Information regarding degree of success, potential improvements and identification of the primary operating constraint if the particular waste reduction measure was taken off-line were identified and discussed.

Subtask A-3 Postaudit Process and Development of Waste Index/Cost Estimate

At the conclusion of the audit process the audit team utilized Table 1 - Hazardous Waste Generation Summary in order to summarize its findings. The purpose of tabulating all pertinent data is to attempt to develop a relationship between product produced, waste generated and the cost of disposal of each unit of waste generated.

The postaudit subtask was also an important task in the overall audit process in that it allowed for the audit team to follow-up its initial investigations with plant personnel to either fill in data gaps, clarify the meaning of information gathered in the audit phase or gather new information based on the tabulation of information in Table 1 referenced above which could have had relevance in selecting waste streams for detailed study.

Task B - Development of Waste Reduction Techniques

Upon the completion of Task A-Waste Reduction Audit, the D&B project team initiated Task B - Waste Reduction Techniques. As part of this task, waste reduction techniques for each of the hazardous waste streams audited under Task A were identified. In order to facilitate this task and in accordance with Chapter Four of the New York State Waste Reduction Guidance Manual, this task was divided into two subtasks that explored source reduction and recycling/reclamation techniques.

Subtask B-1 Preliminary Screening of Source Reduction Techniques

The source reduction techniques that were screened under this task for possible further technical feasibility and cost implications are as follows:

- Good Operating Practice - Good operating practice is perhaps the easiest of all waste reduction techniques to implement at a facility. These techniques generally involve an

administrative, procedural or organizational change rather than a technological change, and as such, usually do not involve a large investment of time, effort or money. Good operating practice techniques that were screened included:

- Employee Education - A successful waste reduction program must start with employee awareness and commitment to the corporation's waste reduction policy.

- Record Keeping - Detailed and accurate record keeping is an essential part of any manufacturing facility. Documentation of all aspects of one's operations can increase product quality, employee safety, equipment reliability and decrease costs by providing details that can be evaluated for possible modifications and improvements. With regard to waste reduction, accurate and detailed records should be kept of waste generation rates, product manufacturing rates, waste handling costs for storage and disposal, manufacturing costs, spills and leaks, disposal facilities, inventory of raw materials and waste storage, and MSDSs. The good operating practice techniques that follow actually involve the record keeping requirement.

- Inventory Control/Material and Waste Tracking - Effective management of inventory will reduce overstocking and disposal of expired raw materials. Inventory should be centralized in order to eliminate excessive stock and ordering by different departments. Material and waste tracking is essential to reduce employee safety hazards in the event of an accident by providing necessary response information quickly.

- Material Usage, Handling and Storage - Programs should be in place to reduce the loss of raw materials due to mishandling and improper storage. An effective method that could be included in a waste reduction plan would be the development of manuals that outline the proper procedures for handling and storage of materials. These manuals could then be included in an employee education/training program. Material usage should be standardized throughout the facility by evaluating technical, economic and safety requirements. GAC has developed manuals for employee education and training. These manuals will be updated to include new technologies and/or modifications applicable to the handling and storage of material.

- Preventive Maintenance - A preventive maintenance program will provide greater reliability to process operations by reducing the likelihood of equipment failure. By making equipment more reliable, efficiency and product quality will increase. Proper maintenance will also reduce the chance of accidental leaks and spills.

o Substitution of Nontoxic or Less Toxic Input Products - Substitution of input products can accomplish waste reduction by reducing or eliminating the hazardous material that enters a process. The change of input products, however, may adversely affect product quality.

- Technological Modification - Technological modifications to a production or manufacturing process can reduce the amount of waste generated by improving efficiency.

- Reformation or Redesign of End Products to Eliminate Production Inputs - The reformation or redesign of GAC's product is considered to be a drastic measure and was not considered after consultation with GAC project management.

Subtask B-2 Preliminary Screening of Reclamation/Recycling Technologies

The reclamation/recycling technologies that were screened under this task for possible further technical feasibility and cost implications are as follows:

- Closed Loop Reclamation - Secondary materials that are reclaimed and returned to the original process in which they were generated and reused in the production process constitute closed loop recycling. One primary requirement of closed loop recycling is that only tank storage can be involved, and the entire process through completion of reclamation is closed by being entirely connected with pipes or other comparable enclosed means of conveyance. The major advantage of closed loop recycling is that the material being recycled is excluded from the definition of a solid waste and, therefore, cannot be classified as a hazardous waste. The use of closed loop reclamation not only would reduce the amount of waste to be disposed of, but also reduce insurance and liability costs and possibly permit requirements.

- Reuse - The reuse of a hazardous waste as a raw material in another production process is an alternative to disposal. This reuse could either be on-site or off-site by utilizing a waste exchange. A waste exchange would be the transfer of wastes from the generator to another company that can use the waste in their operations.

- On-site/Off-site Recycling - There are a variety of techniques that can be utilized to recycle hazardous waste. These techniques include:

  - Distillation
  - Evaporation
  - Solvent Extraction
  - Air Stripping
  - Steam Stripping
  - Carbon Adsorption
  - Sedimentation
  - Decontamination
  - Filtration

- Centrifugation

- Dissolved Air Flotation

In order to determine whether on-site or off-site recycling is to be utilized, the following items were considered.

- o Capital cost for purchase of recycling equipment
- o Operating and cost and training requirements
- o Health and safety risks
- o Quality of recycled material
- o Liability and insurance cost
- o Disposal costs

As is apparent from the source reduction and reclamation/recycle techniques above, a preliminary screening to assess the feasibility of the various waste reduction options was required to reduce the number of options to be more rigorously examined under Task C to a manageable level.

The first step in the preliminary screening process has actually already been completed in concert with Task A - Waste Reduction Audit. Under the audit process, meetings were held with plant engineers and operators of the various departments at which a waste reduction questionnaire was completed. This questionnaire, which was completed in conjunction with GAC, was used as an informal evaluation by the D&B project team to eliminate options believed to be undesirable. A meeting was held with the GAC project team and the GAC Hazmat Technology group to discuss the remaining options and to select the appropriate evaluation criteria. The Hazmat Technology group was formed in early 1991 to identify and evaluate hazardous material reduction methods for GAC. The Hazmat group was organized into several task groups, with each responsible for the evaluation of specific waste reduction methods for the various waste streams identified. The Option Generation work sheets presented in Appendix C were used to list the alternatives under consideration by the various task groups. These options where then described further on the Option Description Work Sheet provided in Appendix D.

Task C - Feasibility Analysis

At this time, due to the early stage of development of each waste reduction option under consideration for the Bethpage facility, it is premature to complete a technical and cost feasibility

evaluation. However, as each project moves into detailed study, the Hazmat Technology Group will implement the following procedure in order to provide GAC management with the knowledge necessary to make an informed decision. Towards this end, this task was divided into three subtasks that concentrated on technical feasibility, cost feasibility, and finally, a selected waste reduction technique to implement.

Subtask C-1 Technical Evaluation of Selected Waste Reduction Techniques

The technical evaluation of waste reduction techniques will determine if a particular option will work in a specific application. It is similar to the preliminary screening conducted under Task B; however, greater detail will be required in order to ensure the success of the selected technique.

It is noted here that many of the improved operating techniques listed in Subtask B-1 are easily implemented and do not require a detailed technical feasibility study. A technical feasibility study will be most useful in situations where there will be a technical modification or input material change. The feasibility study will include the following waste reduction techniques:

- Equipment-related Option - In this section of the technical feasibility study, the commercial availability of the equipment will be evaluated. Testing requirements, if necessary, will be indicated to ensure the integrity of product quality and to determine any possible effects on the production process. Utility requirements will be evaluated for any new equipment. The delivery time and the time required for installation will be indicated as well as its effect on production. Finally, any additional training requirements or material building requirements will be identified.

- Personnel/Procedure-related Changes - Administrative, procedural, or organizational changes, usually do not involve a large investment in time, effort, or money to produce considerable success in waste reduction. However, the equipment-related option or material-related changes often involve personnel or procedure changes that would be required to be part of technical feasibility analysis.

- Material-related Changes - The change of input materials will be evaluated as part of this technical feasibility study. The successful commercial use of any new material will be identified by evaluating case studies and vendor contact. The effect on product quality and impact on production will be identified. When necessary, GAC will perform a material testing program to accomplish this. Additional storage, handling or ancillary equipment will be identified as part of the equipment-related option.

At the conclusion of this subtask, a list of technically feasible waste reduction techniques will be compiled.

Subtask C-2 Cost Evaluation of Selected Waste Reduction Techniques

After the technical feasibility is completed, a cost evaluation will be initiated. This cost evaluation will include capital costs, utility costs, and operating costs.

- Capital Costs - The purchase cost of any new equipment or material will be estimated. The cost of any site preparation, engineering plans and equipment installation will be calculated. Start-up and training costs, as well as any testing program expenses, will also be included. Any new permits that might be required for new equipment will be calculated as part of capital costs. An estimate of any salvage value is also required for any equipment to be purchased.

- Utility Costs - The change in utility costs will be calculated for any new equipment being purchased as part of each waste reduction technique selected. This will include the cost for the new connections as well as the unit cost incurred per time.

- Operating Cost - The change in operating costs will be calculated for each selected waste reduction technique and included the cost of raw materials, labor, operating and maintenance supplies, insurance, and liability as well as any change in revenue for an increase or decrease in production.

Once the selected waste reduction technique had been evaluated with respect to cost, the return on investment number will be calculated for the technique. The internal rate of return (IRR) for each technique that underwent a technical and economic evaluation will be calculated. The IRR will be the financial index utilized to determine if the project should be implemented which will be reviewed by GAC's internal financial analysts. At the conclusion of this subtask, a list of economically practicable waste reduction techniques will be compiled.

Intangible benefits such as public relations and product acceptance are difficult to measure economically but will be considered in the selection of a final waste reduction technique. Other intangible benefits such as worker safety can improve employee relations and productivity. In the selection of a waste reduction technique, the intangible benefits realized could provide the inputs needed to reinforce the final decision.

Subtask C-3 Selection/Scheduling of Technically and Economically Feasible Waste Reduction Techniques

Once the technical feasibility and economic practicality of the selected waste reduction technique are determined, the implementation of the reduction techniques will commence. The

GAC Hazmat Technology group has determined, along with the list of hazardous waste reduction options to be evaluated, a schedule of implementation which includes estimated time for feasibility evaluation and implementation of the various options. This schedule, in conjunction with Grumman's Corporate Waste Reduction Goals were incorporated into the Bethpage Facility Hazardous Waste Reduction Plan.

Task D - Hazardous Waste Reduction Plan

At the completion of the activities described above in Tasks A through C, the D&B project team prepared for submission to the GAC project management a Hazardous Waste Reduction Plan.

1.3 Report Organization

The Grumman - Bethpage HWRP is comprised of nine technical sections. Section 1.0 - Introduction, presents a brief overview of technical and administrative requirements of the New York State statute which requires the preparation of the this HWRP along with its goals and objectives. Also included in Section 1.0 is a presentation of the project scope and report organization. Section 2.0 - Facility Description, presents a brief review of the GAC Bethpage facility. Section 3.0 - Waste Reduction Policy, presents and discusses the GAC corporate waste reduction policy, including the organizational structure responsible for implementing this policy. Section 4.0 - Identification of Waste Streams, identifies and describes the major hazardous waste streams generated at the GAC Bethpage facility. Section 5.0 - Currently Implemented Waste Reduction Measures, profiles the GAC Bethpage waste reduction measures currently implemented. These include segregated solvent waste streams, good operating practices and on-site treatment of metal finishing rinse waters. Section 6.0 - Evaluation of Waste Reduction Measures presents and discusses any of the opportunities for additional waste minimization/reduction evolving from the current audit process. Section 7.0 - Planned Waste Reduction Measures, is comprised of the identification and discussion of planned waste reduction measures, including equipment and material substitution, among others and the facility employee training program. Section 8.0 - Index, Measurement Method, describes the index/measurement methodology, which while not addressed in detail as part of this study, is being evaluated by GAC at the corporate level. Section 9.0 - Areas for Further Study/Conclusions, documents GAC's areas for further study with respect to waste minimization measures and also provides conclusions and recommendations resulting from the HWRP.

1.4 NYSDEC Hazardous Waste Reduction Plan Checklist

In order to aid in the review of this document, a copy of the NYSDEC checklist of items to be submitted as part of hazardous waste reduction plans has been included. This checklist was published by the NYSDEC Division of Hazardous Substances Regulation Bureau of Pollution Prevention in November 1990. The checklist is presented in Table 1-1 and lists the associated section(s) of this document which address each checklist item .

Table 1-1

GRUMMAN AEROSPACE CORPORATION
HAZARDOUS WASTE REDUCTION PLAN - BETHPAGE FACILITY
NYSDEC HAZARDOUS WASTE REDUCTION PLAN CHECKLIST

Checklist Item	Hazardous Waste Reduction Plan Section
1. Identify amounts and types of all acute hazardous waste generated by waste stream.	4.2
2. Identify amounts and types of nonacute hazardous waste by waste stream for waste streams greater than five tons.	4.2
3. Identify at least 90% of all nonacute hazardous waste generated at the facility.	4.2
4. Describe source of generation and waste management method for each waste stream.	4.2
5. Submit block diagram of the process(es) generating the waste (include at a minimum raw material inputs, major process steps/equipment, and product/waste outputs).	4.3 and Appendix A
6. Submit index relating hazardous waste to production or some other index.	8.0
7. Submit cost for managing each waste stream.	4.2
8. For each waste stream, submit an evaluation of:	6.1
- substitution of nontoxic or less toxic inputs,	
- reformulation or redesign of end products to eliminate production inputs,	
- modification or redesign of production processes/ equipment,	
- changes in materials usage, handling and storage practices, etc.,	
- use of closed loop reclamation, reuse or recycling processes to recycle wastes directly back into production process, and	
- use of on-site or off-site recycling technologies.	
9. Submit return on investment number for technically feasible options identified in No. 8.	6.2

Table 1-1 (continued)

GRUMMAN AEROSPACE CORPORATION
HAZARDOUS WASTE REDUCTION PLAN - BETHPAGE FACILITY
NYSDEC HAZARDOUS WASTE REDUCTION PLAN CHECKLIST

Checklist Item	Hazardous Waste Reduction Plan Section
10. Provide list of technically feasible and economically practicable waste reduction measures.	6.2 and 7.1
11. Submit description of corporation's or facility's waste reduction policy.	3.0
12. Provide schedule for implementing technically feasible and economically practicable waste reduction actions.	7.2
13. Submit name of office or department responsible for implementing waste reduction plan.	3.2
14. Provide description of method to be used for measuring waste reduction over time.	8.0
15. Provide description of employee training program.	7.5
16. Provide estimate of anticipated reduction, by waste stream, as a result of implementing waste reduction plan.	7.3
17. Provide estimate of the extent of transference of hazardous waste to another media as a result of implementing plan and the associated overall environmental benefits.	7.4
18. Submit completed Table 1.	4.2 (Table 4-2)
19. Submit completed Table 2	7.3 (Figure 7-2)

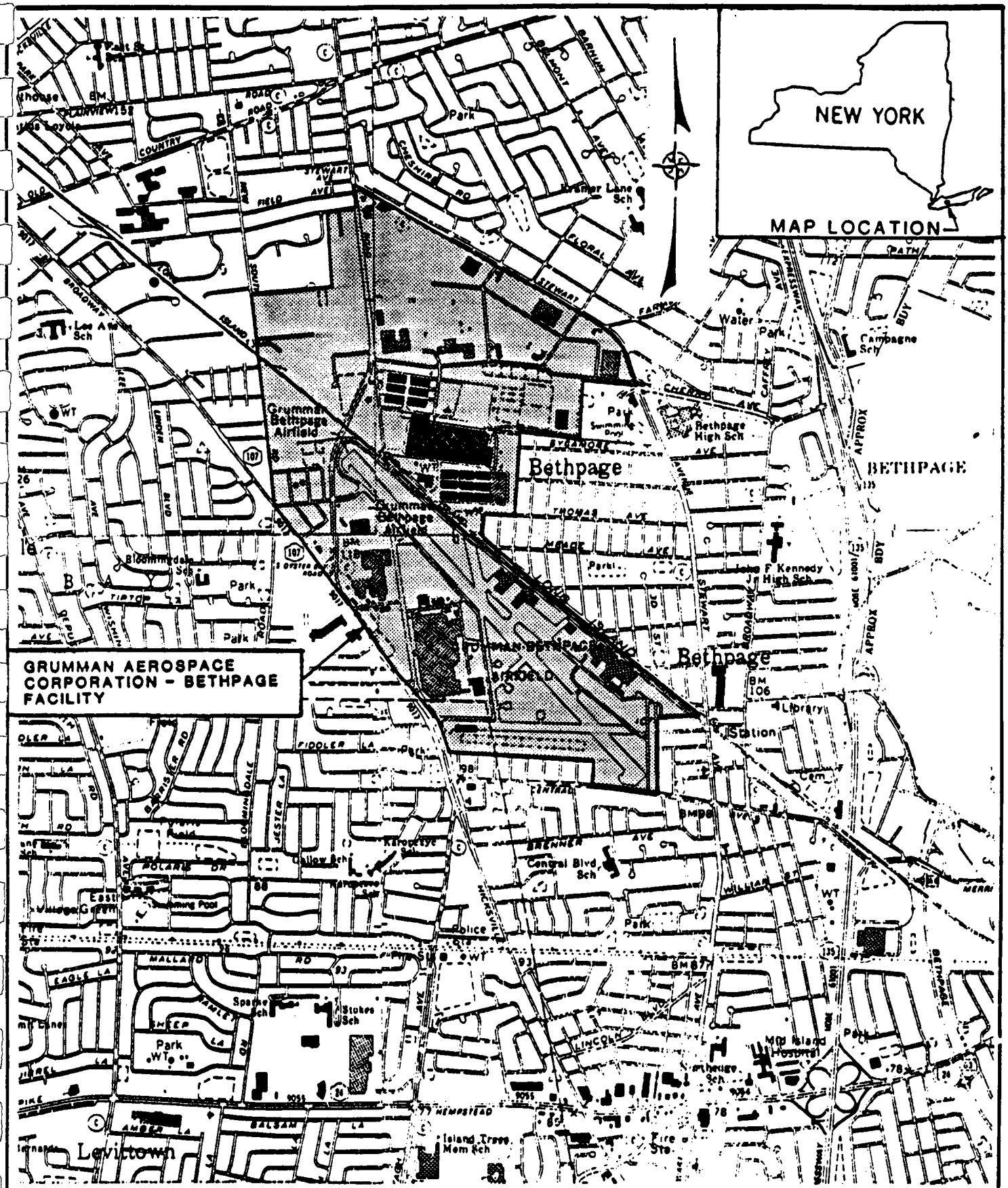
Section 2

2.0 FACILITY DESCRIPTION

Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies. The Bethpage facility, located in Nassau County, New York has been in operation since 1937. The facility currently employs approximately 10,000 people and comprises approximately 575 acres. A location map for the Bethpage facility is presented in Figure 2-1. Figure 2-2 presents a site plan of the Bethpage facility.

There are several operations/processes at the facility which generate hazardous waste. These processes/operations include paint stripping and painting of aircraft or aircraft parts, vapor degreasing, descaling, general cleaning of manufactured parts, chromic acid anodizing of parts, brush cadmium plating metal finishing, chemical milling and etching of aluminum and titanium, conversion coating, heat treating and treatment of waste generated at the Bethpage and Calverton facilities. As a result the facility operates under a New York State Part 373 Permit.

All hazardous waste generated on-site is collected in 55 gallon drums and other containers and ultimately transferred to and stored at this facility before final disposal off-site by licensed vendors. Two Industrial Waste Treatment Facilities (IWTFs) treat industrial wastewater generated by manufacturing processes prior to discharge to the Publicly Owned Treatment Works (POTW) located at Cedar Creek, Nassau County, New York.

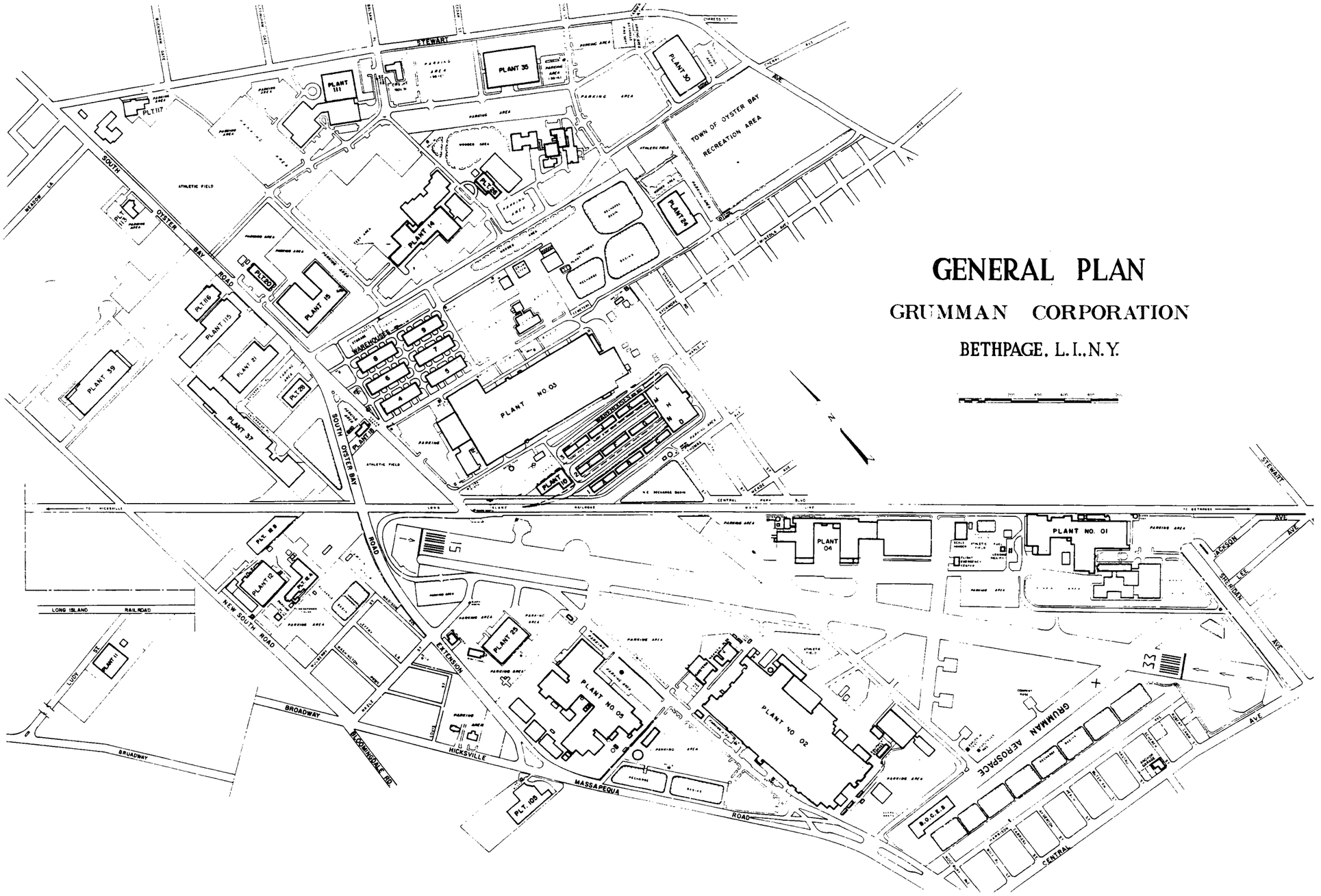


GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY
SITE LOCATION MAP

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 2-1



GRUMMAN AEROSPACE CORPORATION
HAZARDOUS WASTE REDUCTION PLAN-BETHPAGE FACILITY

FACILITY SITE PLAN

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 2-2

Section 3

3.0 CORPORATE POLICY CONCERNING WASTE REDUCTION

Grumman Aerospace Corporation is strongly committed to reducing the volume of hazardous waste generated at all corporate facilities. The practice of reducing waste, known as "waste minimization" will be a continuing theme in all GAC activities through the balance of the twentieth century and beyond. For GAC, waste minimization is not only part of providing a high degree of environmental protection and being a good corporate citizen, it is a sound business policy providing direct cost savings, regulatory conformance, improved public relations and avoidance of near and long-term liability.

3.1 Corporate Waste Reduction Policy

The GAC Waste Reduction Policy approaches hazardous waste generation from two directions: reduction and control of hazardous material usage in production operations and minimization of hazardous waste generated from production operations.

3.1.1 Hazardous Material Usage Control

The first part of the Corporate Waste Reduction Policy is based on "supply side" control of hazardous chemical materials and substances, based on the theory that reductions in hazardous material usage will result in corresponding reductions in hazardous waste generation. Grumman Aerospace Corporation has developed corporate reduction goals which address the most significant hazardous materials used at GAC facilities, including:

- Perchloroethylene
- Trichloroethylene
- Methyl Chloroform
- Methylene Chloride
- Chromium Compounds
- Methyl Ethyl Ketone
- Toluene
- Methyl Isobutyl Ketone
- Xylene
- Chlorofluorocarbon

Table 3-1 summarizes the specific material usage reduction goals developed for each chemical through the year 2000. It is important to note that in every case, hazardous material usage will be reduced at least 50%.

The hazardous chemicals and materials reduction program at GAC utilizes and coordinates the resources of the Environmental Control and Materials/Process Divisions to develop techniques which not only minimize chemical usage, but are implementable in a cost-effective manner without compromising product quality. In addition to "in-house" product quality standards, the GAC chemical usage reduction program must ensure that any material substitutions or operational modifications designed to minimize chemical usage conforms to various military and commercial specifications before being implemented. This program is referred to by GAC as the "Hazmat Technology Program."

To accomplish its chemical usage reduction goals, GAC has developed a multitask approach involving material accounting techniques and inventory control, chemical substitution, process modifications and employee education. Each task in the program is under the direct supervision of a project engineer whose responsibility is to investigate material reduction in his specific area, allocating financial/personnel resources as required. Material reduction techniques are evaluated at all levels of production, from technicians and operators on the process floor, to plant and production managers, to corporate environmental and process directors.

3.1.2 Waste Minimization

In addition to reducing hazardous waste generation through reductions in hazardous chemical usage, GAC has in place a program to minimize waste generation through better management of waste material. A number of waste minimization programs addressing "end of process waste" have been initiated. These include:

- Segregation of Hazardous Waste - Grumman currently segregates a number of wastes to allow for reuse, recycling or uncontaminated disposal. This program is updated and modified as waste characteristics change and new wastes are generated.

- Employee Education - GAC has always educated employees concerning the proper handling and disposal of hazardous material. Programs addressing safety procedures for nearly all of the chemicals in use are sponsored continuously. Specific practices that facilitate the proper disposal of hazardous materials are communicated to employees through an instructional course and literature program.

- Improved Chemical Storage - Protecting containers of virgin chemicals from corrosion and physical damage reduces the risk of contamination of these materials, thereby reducing waste generated due to "off-specification" material.

Table 3-1

GRUMMAN CORPORATION
CORPORATE GOALS FOR HAZARDOUS MATERIAL REDUCTION

	Percentage of 1990 Annual Usage Remaining								
Material	1990	1991	1992	1993	1994	1995	1996	1997	2000
Perchloroethylene (PCE)	100	25	20	20	20	20	20	20	20
Trichloroethylene (TCE)	100	90	50	40	30	20	20	20	20
Methyl Chloroform (TCA)	100	100	100	70	50	50	40	30	20
Methylene Chloride	100	90	70	50	40	30	20	20	20
Chromium Compounds	100	100	50	40	30	20	20	20	20
Methyl Ethyl Ketone (MEK)	100	90	80	60	50	40	30	20	20
Toluene	100	100	95	90	85	80	75	70	50
Methyl Isobutyl Ketone (MIBK)	100	100	95	90	85	80	75	70	50
Xylene	100	100	95	90	85	80	75	70	50
Chlorofluorocarbons (CFC)	100	80	75	65	50	40	15	15	15

3.2 Corporate Waste Reduction Organization

The Corporate Waste Reduction Program at GAC basically coordinates the activities of three departments: Facilities Management, Environmental Protection and Manufacturing. A simplified version of this corporate structure is presented in Figure 3-1.

The Corporate Environmental Protection division is responsible for guiding and overseeing the implementation of any hazardous waste reduction program. Corporate Manufacturing and Facilities Management evaluate waste reduction programs for integration with production operations to ensure product quality standards are not compromised. The Director of Environmental Protection reviews all new process lines prior to implementation, with regard to environmental impacts, and offers comments or approval.

FIGURE 3-1

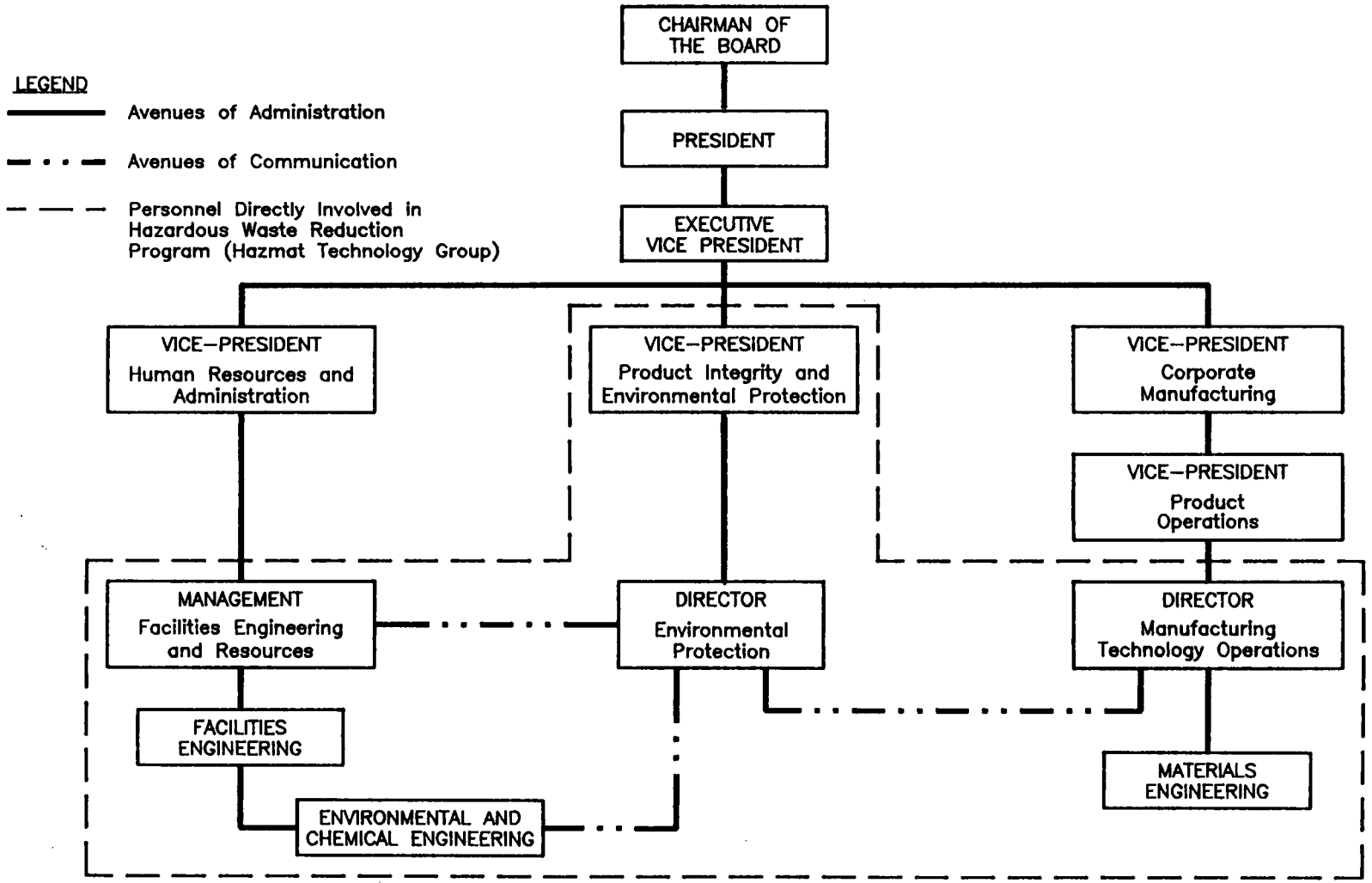
CORPORATE WASTE REDUCTION ORGANIZATION CHART

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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CONSULTING ENGINEERS

Section 4

4.0 IDENTIFICATION OF WASTE STREAMS

Section 4.0 identifies and discusses the hazardous waste streams generated at the GAC Bethpage facility. Between May 2 and May 15, 1991 D&B performed on-site waste audits at the Bethpage facility to identify the processes that contribute to hazardous waste streams and to collect background data pertaining to the generation, handling and disposal of the wastes. To facilitate the audit process a Waste Reduction Questionnaire was completed for each process generating hazardous waste (see Appendix C). The questionnaire addressed, where applicable, seven areas of interest. These include:

- o Background Information
- o Labor Requirements
- o Equipment Requirements
- o Material Usage Information (raw materials, water and energy use)
- o Waste Generation
- o Air Emissions
- o Miscellaneous Operational Data (current or unsuccessful waste reduction attempts)

It should be noted that these forms are identical to those provided in the 1989 New York State Department of Environmental Conservation guidance manual entitled, "New York State Waste Reduction Manual" and are meant to be a guide to the identification and collection of pertinent and relevant technical information. As a result, depending on the process identified, not all data identified as part of the forms were required to be evaluated.

Data collected using the Waste Reduction Questionnaire served as the basis for the evaluation discussed in this Section.

Section 4.0 is presented in three parts. Section 4.1 outlines the waste stream categories established for GAC Bethpage in the facility's Part 373 Permit Application and provides a brief description of each waste stream category.

Section 4.2 quantifies the hazardous waste generated at the facility using information provided in the 1990 Annual Report of Waste Generation and Management for GAC Bethpage. Wastes listed in the 1990 Annual Report are classified under the Part 373 Permit

Categories and those waste streams generated in excess of 5 tons per year are identified for further evaluation in this Hazardous Waste Reduction Plan. Methods of disposal and estimated disposal costs are also presented for these waste streams.

In Section 4.3, the processes which contribute to those waste streams identified in Section 4.2 as being greater than 5 tons per year are discussed in detail.

4.1 Description of Waste Streams

The following section describes the waste streams generated at the Bethpage facility identified in GAC's NYSDEC Part 373 Permit Application. Table 4-1 summarizes the waste categories listed in the Part 373 Permit Application for the facility. The description of each waste stream includes its hazardous characteristics, type and location of storage, method of treatment and/or disposal, and its corresponding waste disposal code.

4.1.1 Metal Finishing Wastewater (D007)

A number of industrial processes at the Bethpage facility generate rinse waters which are treated on-site. Several produce rinse waters containing chromium (D007), others generate nonhazardous wastewaters, however, all rinse waters are commingled prior to treatment.

The rinse water generated at the Bethpage facility can contain chromium in excess of the 5.0 mg/l maximum concentration limit prescribed by the Toxicity Characteristic Leaching Procedure (TCLP) and have therefore been identified as a hazardous waste with an EPA Hazardous Waste Code D007. All wastewater (rinse water) is currently treated at two (2) Industrial Waste Treatment Facilities (IWTF) on the Bethpage site for the reduction and removal of chromium and other heavy metals, the destruction of phenol and other organics, the precipitation of miscellaneous inorganics and final pH adjustment.

The IWTFs discharge treated wastewater to the Nassau County Sewer District No. 3 under the authority of its industrial waste pretreatment program permit, which conveys a mixture of pretreated industrial wastewater and domestic wastewater to the Publicly Owned Treatment Works (POTW) at Cedar Creek, Seaford, NY. As a result, the industrial wastewater treatment facilities are exempt from permitting requirements pursuant to Part 373-1.1(d)(1)(xi).

Table 4-1

HAZARDOUS WASTE STREAMS GENERATED AT THE BETHPAGE FACILITY

1. Metal Finishing Wastewater (D007)
2. Industrial Waste Treatment Facility (IWTF) Sludge (F019, D007, F006, D006)
3. Waste Concentrates
    a. Sodium Hydroxide Solution (D002, D003, D007)
    b. Hydrofluoric Acid (D002, D007, D008)
    c. Deoxidizers (D002, D007)
    d. Alodine (D002, D007)
    e. Nitric Acid Desmut (D002, D007, D008)
    f. Nitric Acid - Hydrofluoric Acid Descale (D002, D007)
4. Waste Halogenated Solvents (F001, F002, F003, F005, D001, D004, D006, D007, D008, D035, D039, D040)
5. Waste Nonhalogenated Solvents (F002, F003, F005, D001, D006, D007, D008, D035, D029, D040)
6. Cadmium Rinse Wastewaters (D006, D007)
7. Paint Trays and Filters (D006, D007)
8. Descale Salt Waste (D003)
9. Off-site Waste
10. Paint Dust, Chips and Sludge (D006, D007, D008)
11. Oil and Water Waste (F002, F003, F005, D001, D004, D006, D007, D008, D035, D040, D0029, D018, D0028, D022)
12. Photo Waste (D001, D006, D007, D011, D035, D029, F003, F005, F002)
13. Miscellaneous Waste (D001, D002, D006, D007, D008, D009, D010, D035, U075, F002, F003, F005)
14. Unknown Waste
    a. Unknown Liquid
    b. Unknown Solid
15. Polychlorinated Biphenyls (B001, B002, B003, B004, B005, B006, B007)

Source: Part 373 Permit Application - Bethpage facility

However, the sludge generated by the treatment of this wastewater at GAC's IWTFs is not exempt from regulation under 6NYCRR 373 and is manifested off-site by a licensed vendor.

4.1.2 Industrial Waste Treatment Facility (IWTF) Treatment Sludge (F019, D006, D007, F006)

Sludge produced at the IWTFs is vacuum dewatered prior to off-site shipment and disposal by a licensed vendor. The IWTF sludge is conditioned with lime and polyelectrolyte and dewatered on a vacuum filter which is precoated with diatomaceous earth. The vacuum filter is capable of dewatering the sludge to a concentration of approximately 23% to 25% dry solids. The dewatered sludge is collected in large roll-off containers.

The sludge is currently being transported by an industrial waste hauler for stabilization and disposal at a secure landfill site. These facilities have, to the best of GAC's knowledge, the appropriate federal, state and local permits and authorizations to accept GAC's hazardous waste and dispose of it in compliance with appropriate regulations and requirements.

4.1.3 Waste Concentrates (D002, D007, D003, D008)

Waste concentrates are generated at GAC's Bethpage Facility. There are several processes used at the Bethpage facility that generate concentrated wastes through the contamination or depletion of processing baths. The contaminated process baths may be disposed of by either industrial waste scavengers or treated on site. These include sodium hydroxide, hydrofluoric acid, deoxidizer, alodine, nitric acid desmut and nitric-hydrofluoric acid descale. These wastes are generated at various locations throughout the facility. The waste concentrates are normally pumped directly from the process tank into local transfer tanks specifically designed to resist the corrosive effects of the wastes. The waste concentrates are generally held in the transfer tanks for a period of 1 or 2 days.

The composition of the process baths are monitored regularly to assure that the process baths meet corporate, military and commercial specifications throughout production. This internal quality control assures consistency in the process bath and consequently in the waste concentrate requiring treatment and disposal. Waste sodium hydroxide generated by certain processes may contain concentrations of sulfides. This sulfide containing sodium hydroxide is removed by a licensed vendor for reutilization.

4.1.4 Waste Halogenated Solvents (F001, F002, F003, F005, D001, D004, D006, D007, D008, D035, D039, D040)

Waste halogenated solvents are generated at various locations throughout the Bethpage facility each year. The largest source of this waste halogenated solvent is from vapor degreaser operations. The vapor degreasers use trichloroethylene and Freon 113 as a cleaning solvent to remove oil, grease and dirt from aircraft parts. Periodically, the degreaser solutions must be disposed of due to an excessive accumulation of contaminants. When this occurs, the contents of the degreaser tank is pumped into 55-gallon drums and solvent reclaimers are contacted to provide bids for removal. This waste is predominantly recoverable trichloroethylene and Freon 113 and GAC is paid for the material.

In addition to the vapor degreasing operations there are other sources of waste halogenated solvents resulting from numerous operations throughout the facility. As a part of GAC's waste segregation program, collection stations are located in close proximity to the points of waste solvent generation. At these stations, 55-gallon collection drums are placed with an identification label indicating the type of waste to be placed in the drum. Various types of halogenated solvents are collected in the waste halogenated solvent collection drums. These typically include trichloroethylene, perchloroethylene, methylene chloride, 1,1,1-trichloroethane and Freon 113. When a collection drum is full, it is closed, labeled, dated and moved either to a Mini-Drum Marshalling Area for up to 10 days of storage prior to being moved to the Main Drum Marshalling Area or directly to the Main Drum Marshalling Area for long-term storage prior to off-site disposal. Refer to Figure 4-1 for general location of marshalling areas.

Grumman Aerospace Corporation makes a composite sample from each drum lot (up to 40 drums) of halogenated solvents to determine halogenated, nonhalogenated and select heavy metals concentrations. This analysis is performed as a check on the internal waste segregation program and is provided to the reclamation contractors for their information.

The compositing of samples is accomplished by withdrawing approximately 100 ml of sample from the drum using a COLIWASA, which is then placed in a glass sample jar. This process is repeated until all the drums in the lot have been sampled and a composite sample of the maximum of 4,000 mls is produced. The volume of this composite sample will vary depending on the number of drums in the lot.

LEGEND

1. MAIN DRUM MARSHALLING AREA
2. MINI DRUM MARSHALLING AREA AT PLANT 03
3. MINI DRUM MARSHALLING AREA AT PLANT 02
4. MINI DRUM MARSHALLING AREA AT PLANT 01
5. INDUSTRIAL WASTE TREATMENT FACILIY AT PLANT 02
6. INDUSTRIAL WASTE TREATMENT FACILIY AT PLANT 03
7. NEW-MATERIAL STORAGE SHED

GENERAL PLAN

GRUMMAN AEROSPACE CORPORATION

BETHPAGE, L.I.,N.Y.

Dvirka and Bartlucci CONSULTING ENGINEERS

HAZARDOUS WASTE MANAGEMENT UNITS LOCATION MAP

FIGURE 4-1

These reclaimers perform all the analyses required prior to final disposal.

4.1.5 Waste Nonhalogenated Solvents (F002, F003, F005, D001, D006, D007, D008, D0029, D035)

Waste nonhalogenated solvents are produced at the Bethpage facility. The waste nonhalogenated solvents consist primarily of ketone based solvents (ignitable) used in the various painting operations.

These waste solvents also contain variable quantities of paint pigments. There are numerous collection stations for these solvents located throughout the facility in close proximity to the source of waste generation. When a collection drum is full it is closed, labeled, dated and moved either to a Mini-Drum Marshalling Area for up to 10 days of storage prior to transfer to the Main Drum Marshalling Area or directly to the Main Drum Marshalling Area for long-term storage prior to disposal. Refer to Figure 4-1 for general location of marshalling areas.

Licensed vendors are contacted to provide bids for removing the waste nonhalogenated solvent. This material has a substantial heat value and is burned as a fuel in waste heat recovery incinerators. The incineration temperatures are in the range of 2400°-2500°F with a retention time of 2 to 5 seconds. Each drum lot is sampled and analyzed to assess heat value, chlorine content and water content prior to bidding. Ash from the incinerator is sent to a secure landfill with the recovery firm providing all the necessary analyses required prior to disposal.

To the best of GAC's knowledge, these facilities have the appropriate permits and authorizations to accept this waste and conduct disposal operations in compliance with all Federal, State and local regulations and requirements.

Grumman aerospace corporation makes a composite sample from each drum lot (up to 40 drums) of waste nonhalogenated solvents to determine halogenated, nonhalogenated and select heavy metals concentrations. This analysis is performed as a check on the internal waste segregation program and is also provided to the solvent contractor for their information.

4.1.6 Cadmium Rinse Wastewaters (D006, D007)

Small amounts of cadmium rinse wastewater are produced from the rinsing of manufactured parts which require a bench brush-on cadmium coating. After the brush-on coating is complete, the area or part is rinsed with water. The rinse water is collected in 55-gallon drums for off-site transport and disposal by an approved transporter and disposal facility. The cadmium coating consists of approximately 9% cadmium, 30% triethanolamine sulfate chelate with the balance comprised of water. The concentration of cadmium is the basis for listing this waste stream as a hazardous waste with a hazard code D006. The transporter and disposal facility are provided with the analytical information on the coating solution concentration.

4.1.7 Paint Trays and Filters (D006, D007)

Paint trays are used at GAC to facilitate the spray painting of parts. Over time, the paint trays become coated with an accumulation of paint as a result of overspray from the painting of parts. After their useful life, paint trays are taken out of service and stored prior to disposal. Since some of the paint accumulated on the trays contains chromium which may leach under the conditions of a TCLP test, paint trays are subjected to an extraction procedure test similar to the TCLP test but on a larger scale due to the physical size of the tray. A description of the extraction procedure developed by GAC is presented in their Part 373 Permit Application. The extract from the extraction procedure test was analyzed for chromium which is the hazardous constituent of concern. To date, paint trays have consistently passed testing requirements and are not considered hazardous. If in the future, they fail these requirements, they will be handled as hazardous waste.

Many of the paint booths are equipped with a dry filter exhaust ventilation system. Over time, the filters become clogged with paint particles removed from the exhaust stream. When the ventilation system experiences an excessive pressure drop, the filter media must be replaced. Since the filters contain paint which may have leachable chromium, the filters are subjected to the TCLP test. Based on the results of the leachate test (chromium greater than 5 mg/l) paint filters are manifested off-site for disposal in a secure hazardous waste landfill.

The secure hazardous waste landfill sites have, to the best of GAC's knowledge, the appropriate permits and authorizations to accept and properly dispose of GAC's hazardous wastes in compliance with all federal, state and local regulations and requirements.

4.1.8 Descale Salt Waste (D003)

Descale salt waste is produced by a descale process which uses salts comprised of a caustic potash chemical. The raw material consists of 65 percent potassium hydroxide, 5 percent potassium chloride and 30 percent potassium nitrate.

The descale salt waste is predominantly a sludge which is removed from the process tank. This sludge consists of potassium nitrate, titanium dioxide and potassium hydroxide. The descale salt process tank maintains the contents at approximately 450°F in a molten state. When the sludge is removed, it is put into 55-gallon drums and cooled. Upon cooling to ambient temperature the sludge solidifies. The solidified descale salt waste is stored in the Main Drum Marshalling Area (see Figure 4-1) prior to shipment to a secure hazardous waste landfill by an approved industrial waste hauler. The descale salt waste possesses some nitrates and is therefore classified as a reactive hazardous waste under 6NYCRR Part 371.

Some of this material, however,is utilized at the industrial waste treatment facilities as a pH adjustment as part of GAC's commitment to minimize its off-site waste disposal operations.

The secure landfill has, to the best of GAC's knowledge, the appropriate permits and authorizations to accept and properly dispose of GAC's hazardous wastes in compliance with all federal, state and local regulations and requirements.

4.1.9 Off-Site Waste

On occasion, the Bethpage facility can accept hazardous waste from off-site facilities such as Calverton, Great River and Woodbury. Since these wastes are not generated at the Bethpage facility they will not be discussed as part of the Hazardous Waste Minimization Plan.

4.1.10 Paint Dust, Chips and Sludge (D006, D007)

Paint dust, chips, and sludge are the debris and residue resulting from cleaning operations occurring in the paint tunnels. Paint dust and chips are produced by removing excess paint from the paint tunnel walls and floors due to overspray during painting operations. This debris is swept into 55-gallon drums and stored at the Main Drum Marshalling Area.

Paint sludge is also the result of overspray during painting operations. Excess paint and water are collected in troughs located beneath the water curtains in each paint tunnel. The water is drawn off and transported to either IWTF (Plant 02 or 03) depending on the location of the paint tunnel. The remaining residue (paint sludge) is collected in 55-gallon drums and transported to the Main Drum Marshalling Area for storage prior to off-site disposal by a licensed vendor.

4.1.11 Oil and Water Waste (F002, F003, F005, D001, D004, D006, D007, D008, D035, D040, D018, D022, D028, D029)

Oil and water waste is generated primarily from the cleaning of heavy machinery and may consist of waste lubricants from cooling and milling operations, waste oil from vehicles, and any miscellaneous oils used on-site. These oils may contain various halogenated solvents, nonhalogenated solvents, alcohols and heavy metals due to contaminated residue in the machinery prior to cleaning operations. Therefore the waste oil and water must be listed as a hazardous waste in accordance with 6NYCRR Part 371. Water is present with the oil due to the cleaning of equipment using water soluble oils (cutting oil). The waste oil and water is collected in 55-gallon drums and transported to the Main Drum Marshalling Area and may be transferred to a 5,000-gallon aboveground steel tank located within the Main Drum Marshalling Area. The wastes are disposed of by a private disposal company which has, to the best of GAC's knowledge, all necessary permits to dispose of the waste.

4.1.12 Photo Waste (D001, D002, D006, D007, D011, D035, D029, F002, F003, F005)

The amount of photo waste generated and stored at the Bethpage facility varies with production rates at the Bethpage facility and other satellite GAC facilities on Long Island.

Several heavy metals such as chromium, cadmium and silver occur in concentrations exceeding limits established in 6NYCRR Part 371. Therefore, this waste stream is identified as a hazardous waste. The photo waste is collected in 55-gallon drums at specific collection points throughout the facility. When the drums are full, they are sealed and labeled and transported to the Main Drum Marshalling Area until off-site disposal can be arranged. Photo waste which contains silver is treated at the IWTF which discharges to the Nassau County Sewer System District No. 3 to the POTW at Cedar Creek, Seaford, NY. Photo waste containing cadmium are stored and disposed of off-site.

4.1.13 Miscellaneous Waste (D001, D002, D006, D007, D008, D009, D010, D035, U027, F002, F003, F005)

Miscellaneous waste consists of off-specification raw materials, lab packs and general solid waste generated at the Bethpage facility.

Lab packs include spent lab materials, outdated and spent laboratory reagents, and general reagents used in laboratories. These materials are packed into 55-gallon drums by a private disposal company. This disposal firm operates under contract which provides for the safe and proper handling and disposal of lab packs in accordance with 49 CFR Parts 172, 173, 178, 179, 40 CFR 265 and 6NYCRR Part 373-3 and all applicable requirements of RCRA and the New York State Environmental Conservation Law. The personnel handling these materials are chemists or chemical engineers with bachelor degrees and are familiar with hazardous waste management practices and procedures. Material Safety Data Sheets are provided by GAC for all known miscellaneous wastes. If the identity of a waste cannot be ascertained, the GAC laboratory at Plant 10 or outside New York State certified laboratory will perform a chemical analyses.

Off-specification raw materials, including chemicals, are regularly identified throughout the manufacturing areas of the Bethpage facility. The list of off-specification chemicals include metal finishing substances, solvents, paints and adhesives. These materials are collected in containers of varying sizes ranging from 1/2 pint to 55-gallon drums. The smaller containers are sealed in lab packs and are handled in the same manner as discussed above. The 55-gallon drums are brought to one of the Mini-Drum Marshalling Areas or to the Main Drum Marshalling Area for storage prior to off-site disposal. The same disposal company handling the lab packs also handles the off-specification chemicals in the same manner.

Incineration, disposal in a secure hazardous waste landfill, or other appropriate methods are the options presently utilized by the private disposal company to dispose of lab packs. The disposal firm operates under a contract which assures their client that overpacking procedures comply with 40 CFR265.316.

Other miscellaneous wastes include rags generated from painting, maintenance, and cleaning operations, cadmium contaminated wastes from the cleaning of machinery used in vacuum depositional operations and other solid waste generated during manufacturing processes. These wastes are placed in 55-gallon drums and are stored at the drum marshalling area prior to

off-site disposal. Analytical profiles are completed on each miscellaneous waste stream prior to off-site disposal by lab pack vendor.

4.1.14 Unknown Waste

In the event that an unlabeled drum of waste arrives at the Main Drum Marshalling Area for storage prior to off-site treatment and disposal, it will be analyzed, then properly drummed and labeled.

4.1.15 Polychlorinated Biphenyls (B001, B002, B003, B004, B005, B006, B007, M001)

PCBs are contained in transformers and other electrical equipment that are used at various locations throughout the Bethpage facility. These electrical devices can contain PCB concentrations greater than 500 ppm. Therefore in accordance with 6NYCRR 371.4(e)(1) the wastes must be listed as hazardous. In addition, lab test kits used at the laboratory facilities located at Bethpage, generate small quantities of PCB oil or PCB contaminated oil. These PCB wastes along with the PCB waste generated from the maintenance of transformers are stored in 55-gallon containers and stored in the New-Material Storage Shed on wooden pallets which are placed within a steel tray providing secondary containment.

4.2 Waste Generation and Management

As discussed in Section 1.0, a Hazardous Waste Reduction Plan must address all waste streams at a facility (based on 1990 data) which are greater than 5 tons per year or which comprise 90% of the total hazardous waste generated at the facility, whichever is greater. In this section, hazardous wastes listed in the 1990 Annual Report of Waste Generation and Management for the Bethpage facility are categorized under the specific waste headings listed in the facility Part 373 Permit Application, and those waste streams in excess of 5 tons per year are identified for additional analysis. Waste streams less than 5 tons per year will not be addressed in this HWRP. With the exception of a negligible amount included in spent laboratory paks, the Bethpage facility did not generate any acute hazardous waste in 1990.

Table 4-2 summarizes the following information for each waste stream generated at the Bethpage facility during 1990:

- Waste Stream Identification from Part 373 Permit
- Waste Disposal Code

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
METAL FINISHING RINSE WASTE-WATER	D002,D003,D007	3 - RINSEWATERS WITH ACIDIC WASTES FROM ELECTROPLATING AND METAL FINISHING OPERATIONS; CONTAINS CHROMIUM.	486,992.20	DISCHARGED TO ON-SITE INDUSTRIAL WASTEWATER TREATMENT FACILITY				SEE IWTF SLUDGE
		4 - RINSEWATERS FROM ELECTROPLATING AND METAL FINISHING, PAINTING AND NON-DESTRUCTIVE TESTING	7,717.50					
INDUSTRIAL WASTE TREATMENT FACILITY SLUDGE	D007,F006,F019	25 - WASTEWATER TREATMENT SLUDGE FROM METAL FINISHING RINSEWATERS	786.50					
		TOTAL	786.50	24.8	OFF-SITE DISPOSAL	SLUDGE	$244,218.00	YES
WASTE CONCENTRATES	D002							
a SODIUM HYDROXIDE SOLUTION		11 - SPENT CAUSTIC SOLUTION, SODIUM HYDROXIDE FROM CHEMICAL MILLING OF ALUMINUM; CONTAINS CHROMIUM	1,768.00	55.8	OFF-SITE DISPOSAL	LIQUID	$338,075.00	YES
b HYDROFLUORIC ACID	D002,D007	15 - WASTE HYDROFLUORIC ACID FROM CHEMICAL ETCHING OF TITANIUM OPERATIONS	210.70	6.7	OFF-SITE DISPOSAL	LIQUID	$50,708.00	YES
c DEOXIDIZERS		NOT LISTED ON GENERATOR REPORT	-----	-----	-----	-----	-----	NO
d ALODINE		NOT LISTED ON GENERATOR REPORT	-----	-----	-----	-----	-----	NO
e NITRIC ACID	D002,D007	NOT LISTED ON GENERATOR REPORT	-----	-----	-----	-----	-----	NO
f NITRIC ACID/HYDROFLUORIC ACID DESCALE		NOT LISTED ON GENERATOR REPORT	-----	-----	-----	-----	-----	SEE HYDROFLUORIC ACID

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
WASTE HALOGENATED SOLVENTS	D001,D004,D006, D007,D008,D035, D039,D040,F001, F002,F003,F005	5 - NON-HALOGENATED AND HALOGENATED SOLVENTS USED IN PAINTING OPERATIONS; CONTAINS CADMIUM, CHROMIUM AND LEAD	26.50					
		10 - SPENT HALOGENATED AND NON-HALOGENATED SOLVENTS FROM DEGREASING OPERATIONS.	15.80					
		16 - WASTE TRICHLOROETHYLENE FROM DEGREASING OPERATIONS.	40.40					
		17 - WASTE FREON FROM DEGREASING OPERATIONS	5.60					
		26 - SPENT HALOGENATED SOLVENTS FROM DEGREASING	1.20					
		27 - WASTE HALOGENATED AND NON-HALOGENATED SOLVENTS FROM PAINT STRIPPING OPERATIONS; CONTAINS CHROMIUM.	5.00					
		46 - WASTE PAINT STRIPPER CONTAINS HALOGENATED AND NON-HALOGENATED SOLVENTS.	1.70					
		TOTAL	96.20	3.0	OFF-SITE RECLAMATION	LIQUID	$31,500.00	YES
WASTE NON-HALOGENATED SOLVENTS	D001,D006,D007, D008,D035,D039, D040,F002,F003, F005	5 - NON-HALOGENATED AND HALOGENATED SOLVENTS USED IN PAINTING OPERATIONS; CONTAINS CADMIUM, CHROMIUM AND LEAD	18.70					
		10 - SPENT HALOGENATED AND NON-HALOGENATED SOLVENTS FROM DEGREASING OPERATIONS	2.40					
		27 - WASTE HALOGENATED AND NON-HALOGENATED SOLVENTS FROM PAINT STRIPPING OPERATIONS; CONTAINS CHROMIUM.	3.60					
		46 - WASTE PAINT STRIPPER CONTAINS HALOGENATED AND NON-HALOGENATED SOLVENTS	1.20					
		TOTAL	25.90	0.8	OFF-SITE INCINERATION	LIQUID	$106,400.00	YES

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
CADMIUM RINSE WASTEWATERS	D006, D007	54 - WASTE CADMIUM SOLUTION FORM BRUSH PLATING OPERATIONS.	1.00	0.0	OFF-SITE DISPOSAL	LIQUID		NO
PAINT CANS AND FILTERS	D007	12 - SPENT PAINT FILTERS CONTAINING CHROMIUM.	2.00					
		31 - EMPTY PAINT CANS	12.70					
		TOTAL	14.70	0.5	OFF-SITE LANDFILL	SOLID	$9,968.00	YES
DESCALE SALT WASTE	D003	NOT LISTED ON GENERATOR REPORT	-----	-----	-----	------	-----	NO
PAINT DUST, CHIPS AND SLUDGE	D006,D007,D008, F002,F003,F005	13 - PAINT SOLIDS AND DEBRIS FROM THE CLEANING OF PAINT BOOTHS	5.60					
		30 - GRIT AND SOLIDS FROM PAINT OPERATIONS WITH HALOGENATED AND NON-HALOGENATED SOLVENTS	0.40					
		37 - WASTE PAINT SLUDGE AND WATER FROM CLEANING OUT PROCESS EQUIPMENT; CONTAINS METALS	2.60					
		38 - SAND BLASTING WASTE FROM PARTS FINISHING, CONTAINS METALS	1.20					
		51 - PAINT SOLIDS WITH HALOGENATED AND NON-HALOGENATED SOLVENTS	5.90					
		TOTAL	15.70	0.5	OFF-SITE DISPOSAL	SLUDGE	$4,080.00	YES

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
OIL AND WATER WASTE	D001,D004,D006, D007,D008,D035, D040,F002,F003, F005	14 - WASTE OIL AND WATER FROM EQUIPMENT MAINTENANCE AND EQUIPMENT OPERATIONS; CONTAINS HALOGENATED AND NON-HALOGENATED SOLVENTS AND METALS	203 90					
		28 - WASTE PETROLEUM DISTILLATES	5 10					
		TOTAL	209 00	6.6	OFF-SITE DISPOSAL	LIQUID	$180,585.00	YES
PHOTO WASTE	D001,D002,D006, D007,D011	NOT LISTED ON GENERATOR REPORT	-----	-----	-----	-----	-----	NO
MISCELLANEOUS WASTE	D001,D002,D006, D007,D008,D009,							
a OFF-SPEC MATERIAL	D010,D035,F002, F003,F005,U075	29 - OFF-SPEC MATERIAL, MIXED LAB PACKS	1.20					
		34 - OFF-SPEC CHEMICAL, PETROLEUM HYDROCARBONS AND TETRACHLOROETHENE	0.70					
		39 - WASTE OFF-SPEC PAINT.	0.20					
		42 - WASTE ALKALINE OFF-SPEC CHEMICALS	0 10					
		44 - UNCURED EPOXY RESINS CONTAINS HALOGENATED AND NON-HALOGENATED SOLVENTS.	0 20					
		45 - OUT-OF-DATE CHEMICALS CONTAINS HALOGENATED SOLVENTS.	1 10					
		47 - OFF-SPEC CHEMICAL, CEMENT.	0.30					
		48 - OFF-SPEC CHEMICAL, ALKALINE LIQUID	0.02					

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
MISCELLANEOUS WASTE (CONT)								
a. OFF-SPEC MATERIAL (CONT)		49 - OUT-OF-DATE ENGINE PARTS CLEANER CONTAINS HALOGENATED SOLVENTS	0.20					
		52 - CORROSIVE OFF-SPEC CHEMICALS.	0.10					
		55 - OFF-SPEC CHEMICAL; DICHLOROMETHANE	1.60					
		56 - FLAMMABLE OFF-SPEC CHEMICAL; CONTAINS NON-HALOGENATED SOLVENTS	0.40					
		57 - DISCARDING OUT-OF-DATE PAINT.	2.30					
		61 - CORROSIVE OFF-SPEC CHEMICALS; CONTAINS CHROMIUM.	0.30					
		64 - OUT-OF-DATE EPOXY RESINS	0.10					
		66 - CORROSIVE OFF-SPEC CHEMICAL; TITANIUM TETRACHLORIDE	0.02					
		OFF-SPEC MATERIAL SUBTOTAL	8.84	0.3	OFF-SITE INCINERATION OR LANDFILL DISPOSAL	LIQUID		YES
b. RAGS		33 - WASTE RAGS CONTAMINATED WITH HALOGENATED SOLVENTS FROM MANUAL DEGREASING OPERATIONS	0.20					
		41 - WASTE PAINT RAGS CONTAMINATED WITH NON-HALOGENATED SOLVENTS	2.40					
		63 - WASTE FLAMMABLE PAINT RAGS.	0.30					
		RAGS SUBTOTAL	2.90	0.1	OFF-SITE DISPOSAL	SOLID		NO

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
MISCELLANEOUS WASTE (CONT.)								
c OTHER WASTE		6 - AEROSOL CONTAINERS; CONTAINS DICHLORODIFLUOROMETHANE.	0.20					
		7 - AEROSOL CONTAINER; CONTAINS PETROLEUM DISTILLATES.	0.20					
		8 - METHYL ETHYL KETONE PEROXIDE USED AS A PLASTICS CATALYST IN TOOL PRODUCTION	0.02					
		24 - CHROMIUM CONTAMINATED CONCRETE FROM DECOMISSING OF PROCESS LINE.	18.90					
		32 - PAINT SPILL CLEAN-UP.	0.02					
		40 - WASTE BATTERIES, FILLED WITH ACID	0.30					
		43 - WASTE CORROSIVE LIQUID FROM LABORATORY OPERATIONS; CONTAINS HALOGENATED AND NON-HALOGENATED SOLVENTS.	0.60					
		50 - WASTE CLAY WITH METALS FROM CLEAN-UP OPERATIONS	0.10					
		53 - SPENT HALOGEN LAMPS	0.10					
		58 - CADMIUM CONTAMINATED TRASH FROM CLEANING OUT PROCESS EQUIPMENT	0.70					
		59 - CHROMIUM CONTAMINATED WASTE FROM PIT CLEAN-OUT.	0.20					

TABLE 4 - 2

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
GENERATED WASTE QUANTITIES FOR THE YEAR 1990

PART 373 PERMIT WASTE STREAM CATEGORY	DISPOSAL CODE	1990 ANNUAL GENERATOR REPORT PAGE NUMBER AND WASTE DESCRIPTION	GENERATED QUANTITY (TONS)	PERCENT OF TOTAL	WASTE MANAGEMENT METHOD	DISPOSAL FORM	DISPOSAL COSTS	INCLUDED IN WASTE REDUCTION PROGRAM?
MISCELLANEOUS WASTE (CONT)								
c OTHER WASTE (CONT)		60 - DIRT CONTAMINATED WITH HALOGENATED SOLVENTS	0.30					
		62 - LIME WITH CADMIUM FROM PIT CLEAN-OUT	0.03					
		65 - ALKALINE WASTE FROM PIT CLEAN-OUT	1.00					
		OTHER WASTE SUBTOTAL	22.67	0.7	OFF-SITE DISPOSAL	LIQUID AND SOLID		NO
		MISCELLANEOUS WASTE TOTAL	34.41	1.1			$426,681.00	-----
POLYCHLORINATED BIPHENYLS	B002,B007,M001	9 - PCB CONTAMINATED TRANSFORMER OIL FROM TRANSFORMER RETROFILL	4.70					
		35 - LABORATORY SAMPLES CONTAMINATED WITH PCB'S	0.02					
		36 - LABORATORY TRASH CONTAINING PCB TEST KITS	0.30					
		TOTAL	5.02	0.2	OFF-SITE DISPOSAL	LIQUID AND SOLID	-----	NO
		TOTAL WASTE GENERATED (1)	3167.13	100.0				
		TOTAL WASTE ADDRESSED IN HAZARDOUS WASTE REDUCTION PLAN (1)	3135.54	99.0				

(1) TOTAL AMOUNT DOES NOT INCLUDE WASTE GENERATED BY METAL FINISHING RINSEWATERS. THESE RINSEWATERS WILL BE ADDRESSED AS PART OF REDUCTIONS TO INDUSTRIAL WASTE TREATMENT FACILITY SLUDGE

- o 1990 Annual Report Waste Description and Quantity Generated
- o Waste Stream Percentage of Total Waste Generated at Bethpage
- o Waste Management Method
- o Waste Form (liquid, solid)
- o Estimated Disposal Cost for Waste Stream

4.2.1 Existing Waste Management System

Hazardous waste generated at GAC Bethpage is stored and shipped in either bulk tanks or drums. Bulk wastes (spent bath tank solutions, etc.) are typically pumped to storage tanks and hauled off-site as necessary by waste disposal vendors under contract with GAC. Each shipment is manifested and weighed prior to leaving the facility and the amount of waste recorded.

All bulk wastes are held in transfer tanks outside the production facilities. Ancillary equipment such as valves and pipes are not readily accessible to intruders or unauthorized personnel, therefore, minimizing the risk of accidental exposure to hazardous wastes stored in these tanks.

To monitor drummed waste, GAC has had in effect for 14-years a waste collection/labeling system. It is used by all facilities owned and operated by GAC. Under this system placed all the hazardous and nonhazardous wastes generated by manufacturing processes used at GAC are stored in drums, segregated into categories of similar and compatible wastes. Each of these categories is given a specific type number. For example, waste paint thinners are placed into the "Type 6" category. Table 4-3 lists all the waste categories by type number, all the wastes within each type, and identifying drum markings colors representing each type.

All waste collection stations at the Bethpage facility display signs with the appropriate waste type, number and color representing the type of waste collected at each station. After the drum has been filled, the drum is marked with the appropriate waste type and transported to the Main Drum Marshalling Area or to one of the Mini-Drum Marshalling Areas with subsequent transportation to the Main Drum Marshalling Area. Once the drum has been delivered to the Main Drum Marshalling Area, it is stored in the appropriate location prior to final off-site disposal.

Table 4-3

GRUMMAN AEROSPACE CORPORATION
WASTE COLLECTION/LABELING SYSTEM

Waste Type	Production Chemical	Container Marking: Background	Container Marking: Letters	Container Marking: Added Message
Type 1	Waste Oils Fuel	White	Red	Flammable
Type 2	Methyl Ethyl Ketone (MEK) Methyl Isobutyl Ketone (MIBK) Acetone	Orange	White	Flammable
Type 3	Crystal Cut (Nonhazardous Synthetic Cutting Fluid)	Black	White	-
Type 4	Halogenated Solvents	Brown	White	-
Type 5	Photo Waste	Green	White	-
Type 6	Nonhalogenated Solvents	Gold	Black	Flammable

Note: For other miscellaneous waste there are additional categories and labels.

All waste stored at the Main Drum Marshalling Area is stored in 55-gallon DOT certified or recertified drums or other containers and are sealed unless authorized Grumman personnel engage in the sampling or filling of these drums. In addition, as previously mentioned, the Mini-Drum Marshalling Areas are equipped with fiberglass sliding doors with locks, and are only open during loading and unloading operations. These features prevent unauthorized personnel from inadvertently coming into contact with hazardous waste stored at these areas.

4.2.2 Data Interpretation

Grumman Aerospace Corporation maintains accurate hazardous waste generation records on a facility-wide basis; however, this approach does not address the specific needs of this HWRP, since waste generation often must be apportioned to specific process trains for a complete evaluation of waste minimization alternatives. To break down the available facility-wide waste data into individual waste streams, the following techniques were utilized:

- Chemical Usage Data - Specific types of waste can be proportioned to the various process streams by comparing raw chemical usage in each process using the premise that a process which uses significant quantity of a certain chemical will generate a proportional amount of the facility-wide waste stream which includes that chemical.

  The amount of chemicals used for each process such as the painting operation was determined through Grumman's Substance Authorization Card (SAC) system. The system is used for inventory control on a facility wide basis. For example, chemicals are shipped to Grumman's main warehouses. From these warehouses, the chemicals are shipped to stockrooms located at each plant. Personnel in each plant must present a SAC card to that plant's stockroom clerk for a particular chemical(s). The SAC cards indicate the volume of the chemical requested (i.e. gallons, quarts, pints, ounces), the department that is requesting the chemicals and the date the chemicals were obtained. Personnel in each department must obtain their chemical coordinator's signature on each SAC card they use. Throughout the year, this information is keypunched into computers so that the total quantities of chemicals used can readily be determined. The computer software used can also output all the chemicals and their quantities that were dispersed to each department in a particular year.

  Often, particular waste descriptions fall under two headings in the 1990 Annual Report such as "Waste Halogenated and Nonhalogenated Solvents from Painting Operations." For these waste descriptions, the total reported waste quantity was separated into individual processes and Part 373 Permit Application categories based on ratios of the amount of virgin chemicals (i.e., halogenated, nonhalogenated) used for the processes, in question using inventory data such as the aforementioned SAC system. For instance, in the paint preparation and application operation the amount of halogenated solvents used during 1990 (H_u) was 13,908 gallons and for nonhalogenated (N_u) solvents it was 9,807 gallons. The ratio of these two values is 1.42. The total combined quantity (T) of halogenated and nonhalogenated waste from paint operations was 45.2 ton/year.

Therefore,

$$H_w + N_w = T \qquad (1)$$
$$H_u = 1.42\, N_u \qquad (2)$$
$$H_w = 1.42\, N_w$$

Where:

H_w = Waste Halogenated Solvents
N_w = Waste Nonhalogenated Solvents
T = Total Waste Halogenated and Nonhalogenated Solvents
H_u = Halogenated Solvents Used
N_u = Nonhalogenated Solvents Used

Substituting $1.42N_w$ for H_w in equation (2) yields:

$$1.42\, N_w + N_w = T \qquad (3)$$

Therefore, $N_w = T/2.42 = 45.2/2.42$
$= 18.7$ tons/yr.

and $H_w = 45.2 - 18.7 = 26.5$ tons/yr.

Similarly, waste reported on a "facility wide" basis can be broken down into individual process using virgin chemical consumption data.

- o Site Inspection - Field inspections allow for a first hand determination of the types of waste generated by a particular process train. For example, it is unlikely that a process contributes to a certain waste stream if the waste piping from that process does not discharge to the waste collection station for that waste. Likewise, if a process train does not utilize a particular chemical, that process can often be eliminated from consideration for the waste stream that includes that chemical.

- o Personnel Interviews - Interviewing process and management personnel provides significant information concerning process operation and waste generation, particularly for "bath tank" processes. Tank capacity, operating schedule, operating procedures, and typical tank solution life all contribute directly to the quantity of waste generated by each process and can be used to proportion "facility-wide" waste streams.

4.2.3 Waste Generation Conclusions

Based on the information presented in Table 4-2, the following waste streams exceeded 5 tons per year during 1990 and will be addressed in this HWRP:

- o Industrial Treatment Facility Sludge
- o Waste Sodium Hydroxide Solution
- o Waste Hydrofluoric Acid Solution
- o Waste Halogenated Solvents
- o Waste Nonhalogenated Solvents
- o Paint Cans and Filters
- o Paint Dust, Chips and Sludge
- o Oil and Water Waste
- o Miscellaneous waste Off-specification Material

These materials constitute more than 99% of the hazardous waste disposed of from the Bethpage facility site during 1990.

It is important to note that the Industrial Waste Treatment Facility sludge is a by-product of on-site treatment of the approximately 500,000 tons per year of metal finishing rinse water generated at the Bethpage facility. Since both are essentially the same waste in dilute and concentrated form, only the Industrial Waste Treatment Facility sludge will be addressed specifically as part of the HWRP for the facility since it is disposed of off-site. When discussing methods of minimizing the Metal Finishing Sludge, this HWRP will, by the nature of the direct connection between rinse waters and sludge production, address methods of minimizing rinse water generation.

4.3 Sources of Hazardous Waste

This section discusses those sources contributing to each waste stream that are generated at a rate of 5 tons per year or more, compiled through on-site audits of processes and operations at the Bethpage facility. Additional information on a particular process can be found on the Waste Reduction Questionnaires in Appendix B.

Table 4-4 summarizes the processes which contribute to each waste stream. The waste streams addressed in Table 4-4 are identified according to the waste stream categories listed in the Part 373 Permit Application for the Bethpage facility. Simplified process schematics for the major process trains which contribute to waste generation are attached to this report in Appendix A.

4.3.1 Industrial Waste Treatment Facility Sludge (F019, F006, D007)

As discussed in Section 4.2.3, Industrial Waste Treatment Facility Sludge is generated as a by-product of on-site treatment of metal finishing rinse waters generated at the Bethpage facility. Although all processes which utilize rinse water contribute to the wastewater treated at the on-site treatment facilities, some processes do not produce D007 (chromium) rinse waters specifically. But, since these non-D007 rinse waters become mixed with the D007 (chromium) rinse waters, they are included in this HWRP.

The following processes contribute to the flow of metal finishing rinse waters and, consequently, to the generation of Industrial Waste Treatment Facility sludge. A summary breakdown of the processes which contribute to the generation of metal finishing sludge is shown on Figure 4-2.

4.3.1.1 - Painting of Aircraft Parts - A simplified schematic of the steps followed in the painting process at the Bethpage facility is presented in Appendix A, Figure A-1. The process sometimes involves pretreating aluminum aircraft parts with alodine and then applying a coat of paint. The aircraft part is wiped with MEK saturated rags. After the parts are allowed to air dry, alodine is wiped onto each part. The final step in the prepaint preparation is to wipe the aircraft part with MEK saturated rags to ensure a clean surface.

The chromium wastewater generated comes from the alodine rinse water and from water curtains used in the painting process to capture paint and alodine overspray. This solution is collected in trench drains and pumped to the on-site water treatment plant.

4.3.1.2 - Paint Stripping Process - Aircraft parts are stripped of paint by applying a mixture of 55% methylene chloride, 15% phenols and 2% chromate solution to the part (see Appendix A, Figure A-2). for small parts, the solvent mixture is applied by brushing. Aircraft components are dipped onto stripping tanks and then rinsed with a high pressure water spray. The waste solvent/rinse water mixture is collected in a sump and pumped to the on-site wastewater treatment

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
TRICHLOROETHYLENE VAPOR DEGREASING	TRICHLOROETHYLENE	not available	HALOGENATED SOLVENTS	10.45	oSPENT SOLVENT FROM DEGREASING AIRCRAFT PARTS
	TRICHLOROETHANE	55			
	ISOPROPYL ALCOHOL	110			
FREON VAPOR DEGREASING	FREON	843.99	HALOGENATED SOLVENTS	1.7	oSPENT FREON FROM DEGREASING AIRCRAFT PARTS
NITRIC/HYDROFLUORIC CLEAN AND DESCALE	NITRIC/HYDROFLUORIC ACID	55	NITRIC/HYDROFLUORIC ACID	105.4	oSPENT/OFFSPEC. ACIDS
	POTASSIUM HYDROXIDE &		POTASSIUM HYDROXIDE &		
	POTASSIUM NITRATE MIXTURE	300	POTASSIUM NITRATE MIXTURE	29.2	oSPENT/OFFSPEC. ACIDS
	AEROWASH	1375	IWTF SLUDGE	71.2	oMETAL FINISHING RINSEWATERS
FINAL CLEANING OF HYDRAULIC TUBING	CHLOROTHENE	110	HALOGENATED SOLVENTS	2.3	oSPENT SOLVENT FROM CLEANING TUBING
	TRICHLOROETHANE	1045			
	LACQUER THINNER	5.0	NON-HALOGENATED SOLVENTS	negligible	oSPENT SOLVENT FROM CLEANING TUBING
	ISOPROPYL ALCOHOL	902	ISOPROPYL ALCOHOL	not available	oSPENT SOLVENT FROM CLEANING RUBBER TUBING
PAINTING AND PAINT STRIPPING OF OF AIRCRAFT PARTS	METHYLENE CHLORIDE	272.45	HALOGENATED SOLVENTS	33.2	oSPENT/OFFSPEC SOLVENTS FROM EQUIPMENT CLEANING AND PAINT MIXING
	TURCO 5469	880	NONHALOGENATED SOLVENTS	23.5	
	CEE BEE C-50	3905	PAINT DUST, CHIPS AND SLUDGE	15.3	oRAGS AND OFFSPEC/UNUSED PAINT
	CHLOROTHENE	4405	PAINT CANS AND FILTERS	12.7	PAINT SOLIDS FROM STRIPPING PROCESS
	FLOW CONTROL	4446	IWTF SLUDGE	21.8	oSOLVENT AND PAINT RINSEWATERS
	LACQUER THINNER	880			
	MEK	6985			
	VARSOL	55			
	MIBK	732			
	TOLUENE	1210			
	ISOPROPYL ALCOHOL	672			
	ALODINE	55			

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
CLEANING OF METAL PARTS PRIOR TO AND FOLLOWING SPOT WELDING	NITRIC ACID	750.0	IWTF SLUDGE	7.9	oMETAL FINISHING RINSEWATERS
CLEAN, CONVERSION COATING AND HARDCOAT	CHROMATE DEOXIDIZER	160.0	DEOXIDIZER	19.6	oMETAL FINISHING RINSEWATERS
	NITRIC ACID	405.0	NITRIC ACID	13.1	oMISCELLANEOUS CLEANING
	ALODINE	4.0	IWTF SLUDGE	7.9	
	FLOW CONTROL	55	HALOGENATED SOLVENTS	0.15	
MACHINE TOOLS AND MISC. MANUFACTURING	TRICHLOROETHANE	20.0	HALOGENATED SOLVENTS	0.15	oSPENT/OFF-SPEC SOLVENTS FROM
MACHINE OPERATIONS & MAINTENANCE	LACQUER THINNER	110	NON-HALOGENATED SOLVENTS	0.25	CLEANING PARTS
	MEK	14.0	OIL AND WATER WASTE	8.4	
	TOLUENE	8.0			
	VARSOL	2.0			
	ISOPROPYL ALCOHOL	114.0			
FORMING OF PARTS WITH DROP HAMMER	TRICHLOROETHANE	440	HALOGENATED SOLVENTS	1.0	oSPENT/OFF-SPEC SOLVENTS FROM CLEANING
	MEK	2.0	NON-HALOGENTATED SOLVENTS	0.3	PARTS,TOOLS, AND FORM BLOCKS
	VARSOL	55			
	ISOPROPYL ALCOHOL	4.0			
INSPECTION OF MANUFACTURED PARTS	ZYGLO PENETRANT	not available	NONE	------	NONE
CHROMIC ACID ANODIZING	TRICHLOROETHYLENE	not available	HALOGENATED SOLVENTS	14.1	oSPENT/OFF-SPEC MATERIAL
	DEOXIDIZER	1.5	DEOXIDIZER	76.7	
	CHROMIC ACID	5.5	ANODIZE SEAL	435.3	
	ANODIZE SEAL - CROMIC ACID	1000.0	IWTF SLUDGE	127.7	
	SODIUM HYDROXIDE	1000.0	SODIUM HYDROXIDE	138.1	oMETAL FINISHING RINSEWATERS

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
CHEM MILL MASK APPLICATION AND ETCHING	PERCHLOROETHYLENE	not available	HALOGENATED SOLVENTS	not available	oPCE IS A SOLVENT IN MASKANT
	HYDROFLUORIC ACID	not available	HYDROFLUORIC ACID	105.3	oSPENT/OFF-SPEC ACID FROM ETCHING
	NITRIC ACID	not available	NITRIC ACID	162.5	oSPENT/OFF-SPEC ACID FROM ETCHING
	SODIUM HYDROXIDE SOLUTION	not available	SODIUM HYDROXIDE	1768.0	oSPENT/OFF-SPEC ACID FROM ETCHING
			IWTF SLUDGE	221.7	oMETAL FINISHING RINSEWATERS
SULFURIC ACID ANODIZING	TRICHLOROETHYLENE	not available	HALOGENATED SOLVENTS	2.0	oSPENT/OFF-SPEC SOLVENT FROM
	DEOXIDIZER	3600	DEOXIDIZER	73.4	DEGREASING OPERATIONS
	ALODINE	2000	SULFURIC ACID	12.2	oSPENT/OFF-SPEC ACIDS
	SULFURIC ACID	not available	IWTF SLUDGE	111.8	oMETAL FINISHING RINSEWATERS
	SODIUM DICHROMATE	550			
BRUSH CADMIUM PLATING	CADMIUM SOLUTION	46.0	CADMIUM RINSE WATERS	1.0	oCADMIUM PLATING OPERATION
HEAT TREAT PROCESS	TRICHLOROETHYLENE	not available	HALOGENATED SOLVENTS	14.1	oSPENT SOLVENT FROM DEGREASING
	MEK	1.0	NON-HALOGENATED SOLVENTS	negligible	oMISCELLANEOUS CLEANING
	ALODINE	4.0			
ENGRAVING AIRCRAFT COMPONENTS	SODIUM HYDROXIDE SOLUTION	5.0	HALOGENATED SOLVENTS	negligible	oSPENT/OFF-SPEC SOLVENTS FROM
	LAQUER THINNER	5.0	NONHALOGENATED SOLVENTS	0.25	CLEANING PARTS
	ENAMEL PAINT	2.0	PAINT CANS & FILTERS	negligible	oSPENT/OFF-SPEC MATERIAL
	ACETONE	214.0	PHOTO WASTE	not available	oSPENT PHOTOCHEMICALS
	MEK	8.0			
	METHELYNE CHLORIDE	2.25			
	FIXER	10.0			
	STOP BATH	10.0			
	DEVELOPER	11.0			
	SEALING ADD	10.0			
	IMAGE INTENSIFIER	5.0			
	EMULSIFIER	9.0			
	MIBK	18.5			
	ISOPROPYL ALCOHOL	44.5			
	TOLUENE	3.5			
	TRICHLOROETHYLENE	1.0			

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
ALODINE PROCESS	CEE BEE C-50 MEK LACQUER THINNER NITRIC ACID DEOXIDIZER ALODINE	110 1.0 55 not available 2.02	HALOGENATED SOLVENTS NONHALOGENATED SOLVENTS DEOXIDIZER IWTF SLUDGE	0.15 0.1 1.5 51.5	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING PARTS oSPENT/OFF-SPEC MATERIAL oMETAL FINISHING RINSEWATERS
STRUCTURAL TESTING OF AIRCRAFT ASSEMBLIES	TRICHLOROETHANE CHLOROTHENE CEE BEE C-50 TURCO FREON TF MEK TOLUENE LACQUER THINNER ISOPROPYL ALCOHOL VARSOL	11.0 7.0 5.0 3.25 3.0 15.0 3.0 9.0 3.0 275.0	HALOGENATED SOLVENTS NONHALOGENATED SOLVENTS OIL AND WATER WASTE	0.15 0.6 16.8	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING PARTS
BRUSH ALODINING	ALODINE	54.45	ALODINE IWTF SLUDGE	negligible 5.0	oUNUSED ALODINE PUMPED TO HOLDING TANK oMETAL FINISHING RINSEWATERS
MODEL SHOP	CEE BEE C-50 LAQUER THINNER VARSOL	10.0 1.0 15.0	HALOGENATED SOLVENTS NON-HALOGENATED SOLVENTS	negligible 0.15	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING PARTS
ADVANCED MATERIALS AND PROCESS DEVELOPMENT	LACQUER THINNER	55	NON-HALOGENATED SOLVENTS	negligible	oEQUIPMENT CLEANING

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
INSTRUMENT TESTING	CHLOROTHENE	6.0	HALOGENATED SOLVENTS	negligible	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING PARTS
	CEE BEE C-50	1.0			
	FREON 114	188.4			
	FREON TE	221			
	ISOPROPYL ALCOHOL	1.0			
ELECTRON BEAM WELD	TRICHLOROETHANE	55	HALOGENATED SOLVENTS	0.15	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING WELD JOINTS
	MEK	8.0	NON-HALOGENATED SOLVENTS	negligible	
AIRCRAFT STRUCTURAL ASSEMBLY	METHYLENE CHLORIDE	529.58	HALOGENATED SOLVENTS	15.7	oSPENT/OFF SPEC. SOLVENTS FROM CLEANING PARTS AND EQUIPMENT
	CHLOROTHENE	609	NON-HALOGENATED SOLVENTS	0.75	
	VARSOL	274.1	OIL AND WATER WASTE	6.3	
	CEE BEE C-50	1391.73			
	TURCO	1.43			
	TRICHLOROETHANE	3405.55			
	ISOPROPYL ALCOHOL	200.51			
	MEK	86.73			
	FLOW CONTROL	84.81			
	FREON TB-1	1201			
	FREON PCA	56.26			
	FREON TE	198			
	FREON 114	2.25			
	TOLUENE	12.25			
RESEARCH AND DEVELOPMENT	MISC. CHEMICALS		HALOGENATED SOLVENTS	negligible	oRESEARCH AND DEVELOPMENT

TABLE 4 - 4

GRUMMAN AEROSPACE CORPORATION - BETHPAGE FACILITY
1990 HAZARDOUS WASTE GENERATION BY PROCESS

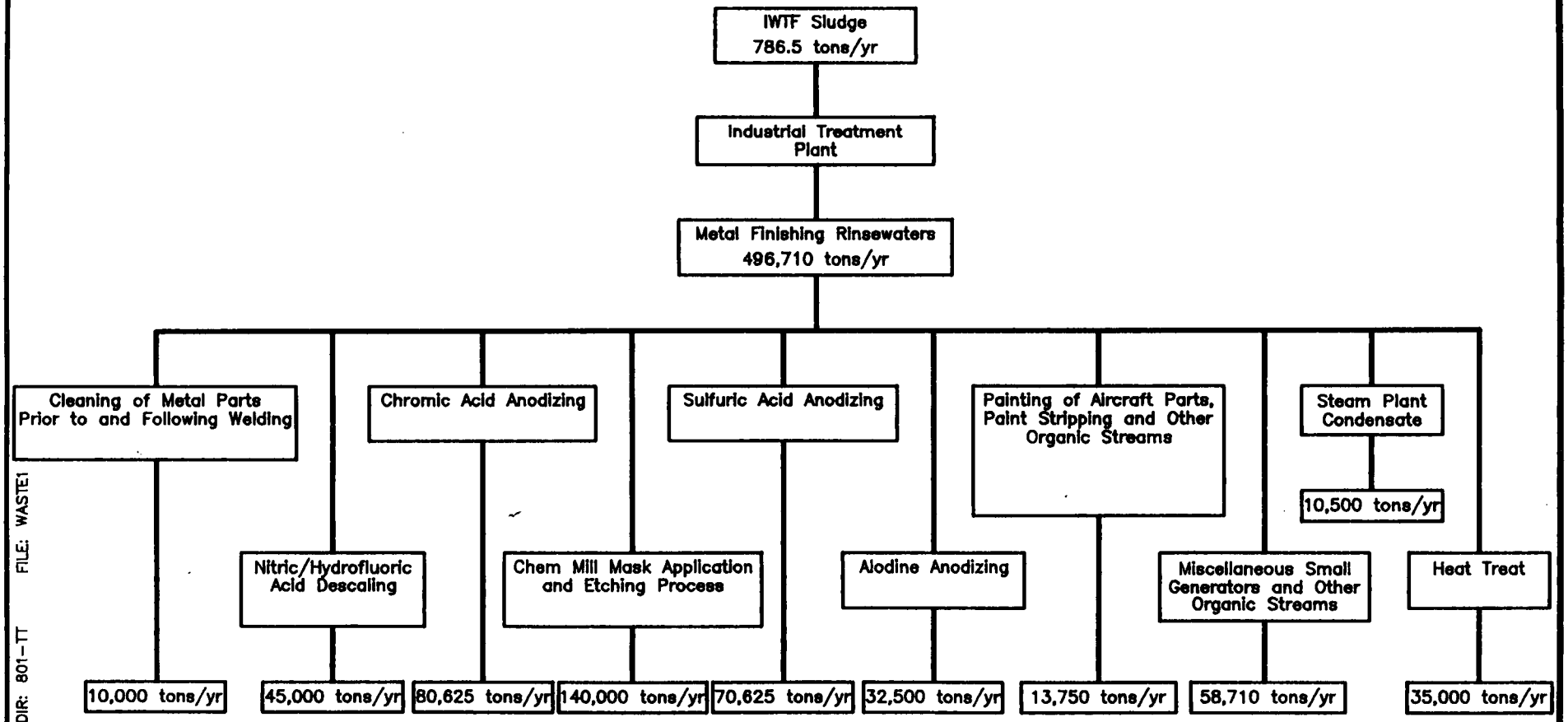
PROCESS NAME	HAZARDOUS MATERIALS USED	AMOUNT USED (GAL.)	HAZARDOUS WASTE GENERATED	AMOUNT OF WASTE GENERATED (TONS)	HOW HAZARDOUS WASTE WAS GENERATED
PHOTO CHEMICAL LAB	MISC. PHOTOCHEMICALS	not available	NONE	--------	
CORPORATE RESEARCH CENTER LABORATORIES	MISC. CHEMICALS	not available	NON-HALOGENATED SOLVENTS ACETONE	negligible	oRESEARCH AND DEVELOPMENT
EQUIPMENT MAINTENANCE OF MANUFACTURING AND TRANSPORTATION MACHINES	NONE	NONE	OIL AND WATER WASTE	167.0	oMAINTAINING EQUIPMENT
WAREHOUSE CHEMICAL STORAGE AREA	TOLUENE	not available	NON-HALOGENATED SOLVENTS	negligible	oSPENT SOLVENTS AND RAGS FROM EQUIPMENT CLEANING
ROUTER AND SHEAR OPERATIONS	MEK TOLUENE ISOPROPYL ALCOHOL	not available not available not available	NON-HALOGENATED SOLVENTS OIL AND WATER WASTE	negligible 10.5	oSPENT/OFF-SPEC SOLVENT FROM CLEANING PARTS AND EQUIPMENT
FLIGHT OPERATIONS	TURCO VARSOL ISOPROPYL ALCOHOL	not available not available not available	HALOGENATED SOLVENTS	negligible	oCLEAN PARTS DURING AIRCRAFT MAINTENANCE

FIGURE 4-2

WASTE SUMMARY

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



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plants. For parts that still have paint residue on the surface, the part is wiped with the solvent mixture, steel brushed until clean and rinsed with a high pressure water spray. The rinse waters are pumped to the on-site wastwater treatment plant. The paint chip solids are collected in a sump and drummed to be disposed of off-site.

4.3.1.3 - Chromic Acid Anodizing - In this process, aluminum aircraft parts are anodized using chromic acid. The anodizing process applies a chemical coating to the part that provides electrical corrosion protection.

Before anodizing, the part is degreased with trichloroethylene vapors. The part is then placed in an alkaline cleaning tank, then rinsed with tap water. It is then dipped in a sodium hydroxide solution for etching, a deoxidizer to remove oxide deposits on the metal and a rinse water tank. Once etched and rinsed, the part is anodized in a chromic acid solution and receives an anodize seal.

The rinse water tanks are pumped directly to the on-site treatment plants. The waste concentrate tanks, when contaminated or considered off specification material, are pumped into transfer tanks and conveyed to the treatment plant.

4.3.1.4 - Other Chromium Processes - The following processes directly produce chromium rinse water.

- Cleaning of metal aircraft parts prior to welding (see Appendix A, Figure A-3)
- Sulfuric acid anodizing (see Appendix A, Figure A-5)
- Alodine Anodizing (see Appendix A, Figure A-6)
- Heat Treat Process (see Appendix A, Figure A-7)
- Steam Plant Condensate
- Vacuum Deposition of Cadmium (see Appendix A, Figure A-16).

In each of these processes, the aircraft parts are dipped in tanks containing chromic acid and then rinsed in water tanks. As a result of the parts dipping process, these acid baths eventually become contaminated are determined to be off specification material and are discharged with the rinse water to the on-site treatment plants.

4.3.1.5 - Other Processes - These processes do not produce chromium wastewater by themselves, but produce rinse waters which are commingled with the chromium wastewater before being discharged to the on-site treatment plants.

- o Clean and descale (see Appendix A, Figure A-8)
- o Final cleaning of hydraulic tubing (see Appendix A, Figure A-9)
- o Chem mill mask and etch (see Appendix A, Figure A-10)
- o Zyglo penetrant inspection (see Appendix A, Figure A-11)
- o Photographic processing
- o Cad plating operation (see Appendix A, Figure A-12)

These processes also involve dipping aircraft parts into tanks. The waste generated from the tanks are discharged to the on-site treatment plants along with chromium contaminated wastewater.

4.3.2 Waste Concentrate (D002, D003, D007) - Sodium Hydroxide Solution

A process breakdown for waste sodium hydroxide solution generated at the Bethpage facility is presented in Figure 4-3.

4.3.2.1 - Chem Mill Mask Application and Etching Process - A chemical mask coating containing perchloroethylene is applied to metal aircraft parts. The mask which is a "peelable," rubber like substance is removed in those sections where the part will be etched. After the metal is etched, the mask is peeled off (see Appendix A, Figure A-10).

Sodium hydroxide is utilized to etch aluminum parts, while hydrofluoric acid is used to etch titanium parts. Once etching is completed, nitric acid is used to remove a black film from the surface of the part that results from the etching process. Rinse tanks are used to minimize the "drag out" of chemicals passed from one tank to another. The rinse tanks extend the life of the acid baths by reducing contamination. The rinse waters are directly pumped to the on-site treatment plants. The waste concentrate baths are pumped into holding tanks and delivered to the treatment plants. The perchloroethylene is reclaimed through the perchloroethylene recovery system recently installed in the exhaust system at the maskant area.

4.3.3 Waste Concentrate (D002, D007, D008) - Hydrofluoric Acid

Figure 4-4 presents a breakdown of the processes which contribute to waste hydrofluoric acid solution at the Bethpage facility.

FIGURE 4-3

WASTE SUMMARY

FOR
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

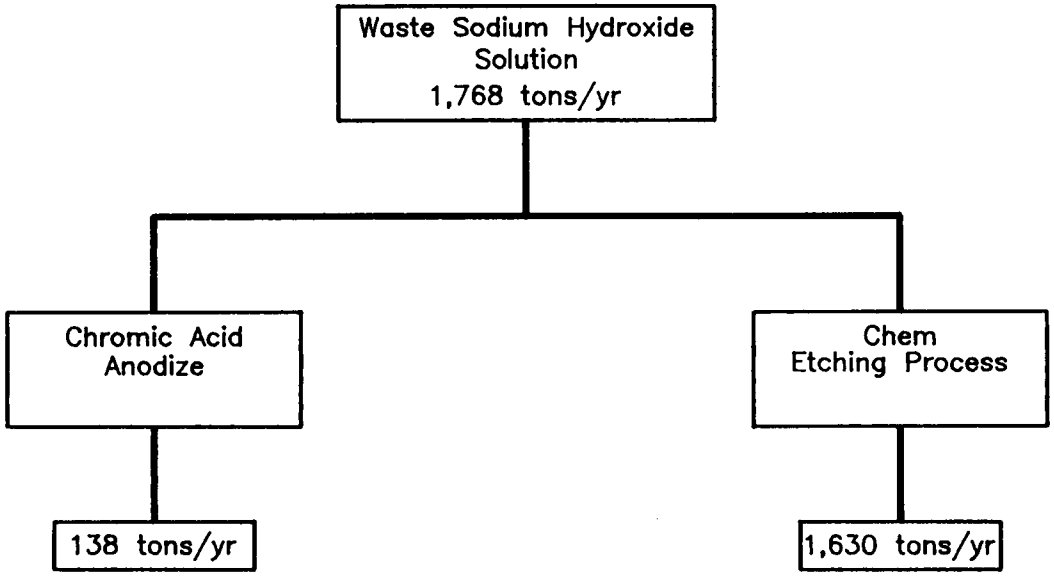

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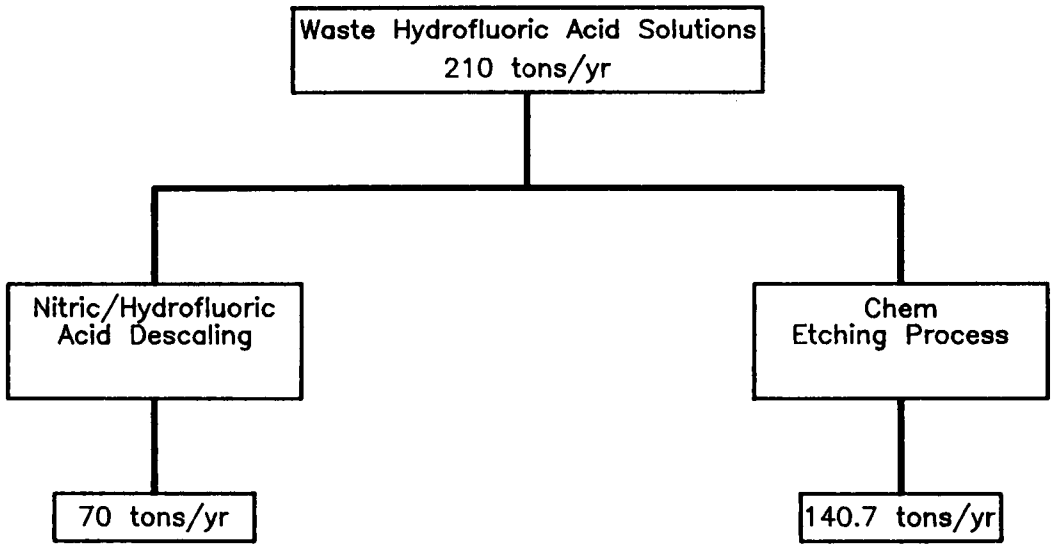
FIGURE 4-4

WASTE SUMMARY

FOR
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



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4.3.3.1 - Nitric/Hydrofluoric Acid Descaling - The Bethpage facility performs acid descaling as part of small and large scale operations. In the small scale operation a nitric/hydrofluoric acid solution is used to etch steel and titanium hydraulic tubing prior to welding (see Appendix A, Figure A-13). A small plastic container is filled with approximately one gallon of acid, and the ends of hydraulic tubing are placed in the acid. The tubing is then neutralized in a water rinse sink, through which water is constantly running during the day shift to keep it pure. Every four hours the acid in the plastic container, whether it is used or not, must be changed according to contract specifications. The unused acid is placed into 55-gallon drums to be taken to the treatment plants.

In the larger operation, titanium and steel aircraft parts are descaled before the part is stress relieved or hot formed in the heat treat process (see Appendix A, Figure A-7). The descaling process removes any scale that has formed on the metal due to oxidation. After the part is descaled and heat treated it is cleaned in an alkaline rinse tank.

The part is first dipped into a Kolene (potassium hydroxide and potassium nitrate) solution, after which it is rinsed with water. It is then descaled using nitric/hydrofluoric acid and subsequently heat treated, and rinsed in an alkaline cleaner.

When the rinse water is determined to be spent, it is pumped directly to the on-site industrial waste treatment plants. The Kolene and nitric/hydrofluoric acid solutions are pumped into transfer tanks and disposed of off-site.

4.3.3.2 - Chem Mill Mask Application and Etching Process - This process was discussed previously in Section 4.3.2. As mentioned earlier the hydrofluoric acid is used to etch titanium aircraft parts only (see Appendix A, Figure A-10).

4.3.4 Waste Halogenated Solvents (F001, F002, F003, F005, D001, D004, D006, D007, D008, D035, D039, D040)

Figure 4-5 shows a breakdown of the waste halogenated solvents generated at the Bethpage facility. Trichloroethylene and Freon have been broken out individually since these solvents are segregated and disposed of separately.

FIGURE 4-5

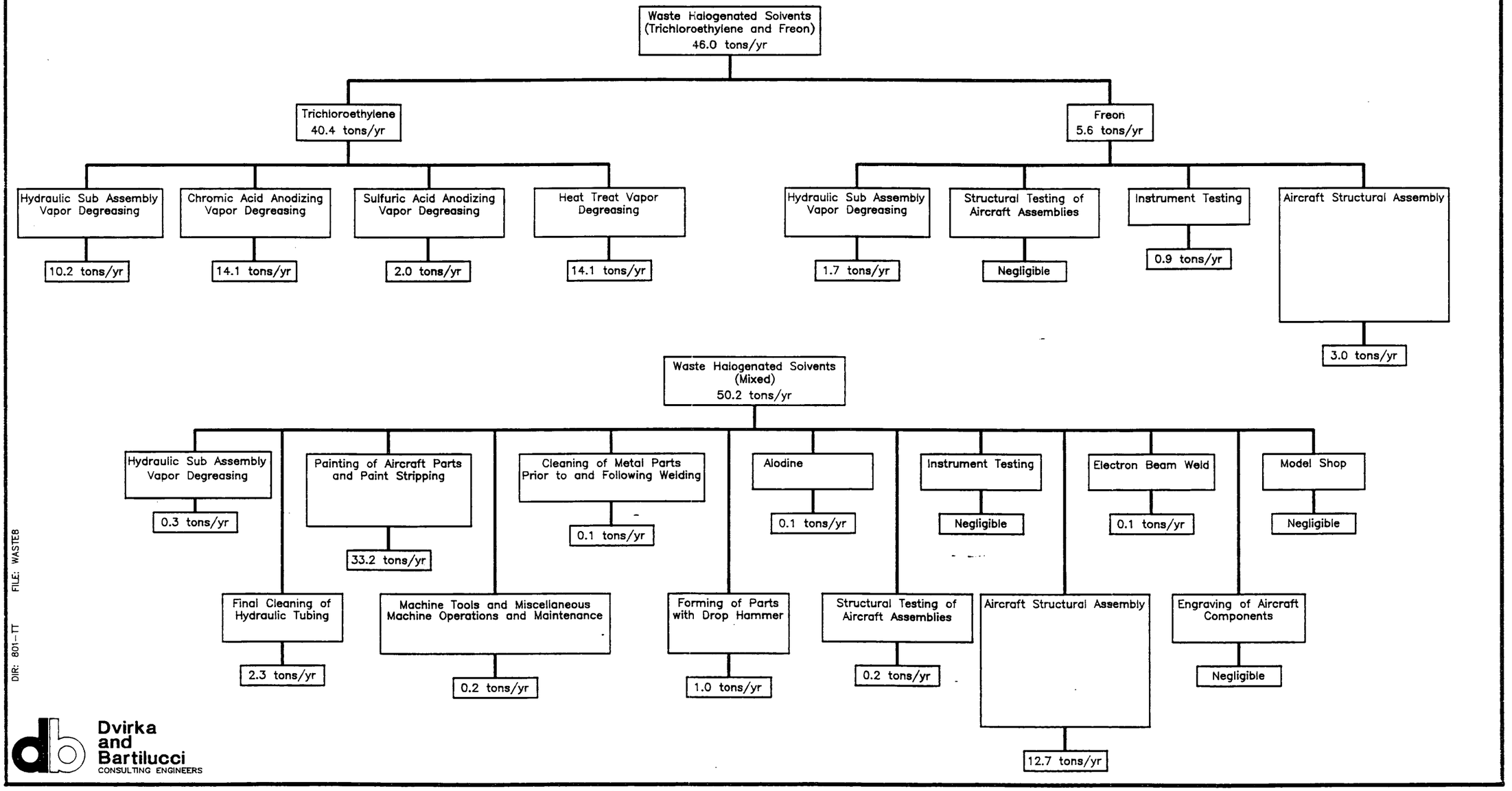
WASTE SUMMARY

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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4.3.4.1 - Trichloroethylene Vapor Degreasing - In various locations at the Bethpage facility, trichloroethylene is utilized as a solvent to remove oil, grease and dirt from aircraft parts prior to additional processing (see Appendix A, Figure A-14). The trichloroethylene is contained in open tanks that have cooling coils in the upper area of the tank. The cooling coils are used to prevent the solvent vapors from escaping and are on 24 hours a day. Aircraft parts are placed in wire baskets that are lowered into the solvent vapors. After approximately 3 to 5 minutes, the baskets are removed from the vapors. When the parts are removed, they are dry, eliminating solvent dripping from the parts being cleaned.

Periodically, the tank contents are tested for contamination by GAC employees. If the tank contents are contaminated, the off-specification solvent is pumped to transfer tanks for temporary storage prior to being transported to off-site solvent reclaimers.

The processes that utilize trichloroethylene vapor degreasers include:

- Chromic Acid Anodizing (see Appendix A, Figure A-4)
- Sulfuric Anodizing (see Appendix A, Figure A-5)
- Heat Treat Process (see Appendix A, Figure A-7)
- Hydraulic Subassembly.

4.3.4.2 - Freon Vapor Degreasing - Freon is used as a cleaning solvent to remove oil, dirt and grease from tubing as used in aircraft assemblies (see Appendix A, Figure A-15). The Freon is housed in a tank that is kept covered and locked until needed. To keep the Freon vapors from escaping, cooling coils are located near the top of the tank and kept on 24 hours a day.

To complete the degreasing process, metal tubing is placed in a basket and lowered into Freon vapors for 3 to 5 minutes. After the prescribed time period, the basket is removed from the vapor degreaser. Since Freon vapors are utilized for degreasing, when the basket is removed the parts are dry. As a result, excess solvent does not drip from the clean tubing. For stubborn dirt and grease, the tubing is submerged into a liquid Freon Ultrasonic tank, where ultrasonic waves pass through the liquid and dislodge any dirt on the metal tubing.

Every four to five weeks, one 55 gallon drum of Freon is added to the tank to replace the Freon lost due to evaporation. Periodically, the degreaser is checked for contamination by GAC employees. If there is excessive contamination, the contents of the tank is drummed and transported off-site for solvent reclamation.

4.3.4.3 - Miscellaneous Halogenated Solvents - The following list of processes and operations use various halogenated solvents to remove grease and dirt from aircraft parts. Typically in these operations, rags are dipped into the solvents and are used to wipe a part clean.

- o Final Cleaning of Hydraulic Tubing - Aluminum parts are cleaned with trichloroethane after the descale process (see Appendix A, Figure A-9)
- o Paint and Paint Stripping Operations (see Appendix A, Figures A-1 and A-2)
- o Machine Tools and Miscellaneous Machine Operations and Maintenance - This operation involves cutting metal and machining tools
- o Structural Testing of Aircraft Assemblies - Parts are cleaned prior to testing
- o Forming of Parts with Drop Hammer
- o Electronic Instrument Testing - Freon is utilized to clean electric components prior to testing
- o Electron Beam Weld - Metal aircraft parts are welded using an electron beam
- o Engraving Aircraft Components

4.3.5 Waste Nonhalogenated Solvents (F002, F003, F005, D001, D006, D007, D008, D029, D035, D039, D040)

A breakdown of the processes which contribute to waste nonhalogenated solvent generation at the Bethpage facility is presented in Figure 4-6. The waste nonhalogenated solvents consist primarily of ketone based solvents. The following list of processes utilize these solvents for general cleaning purposes. The solvent is typically applied with rags.

- o Machine Tools and Miscellaneous Machine Operations and Maintenance
- o Painting and Paint Stripping Operations
- o Engraving of Aircraft Components
- o Aircraft Structural Assembly
- o Structural Testing of Aircraft Assemblies
- o Corporate Research Projects
- o Electron Beam Weld
- o Model Shop

FIGURE 4-6

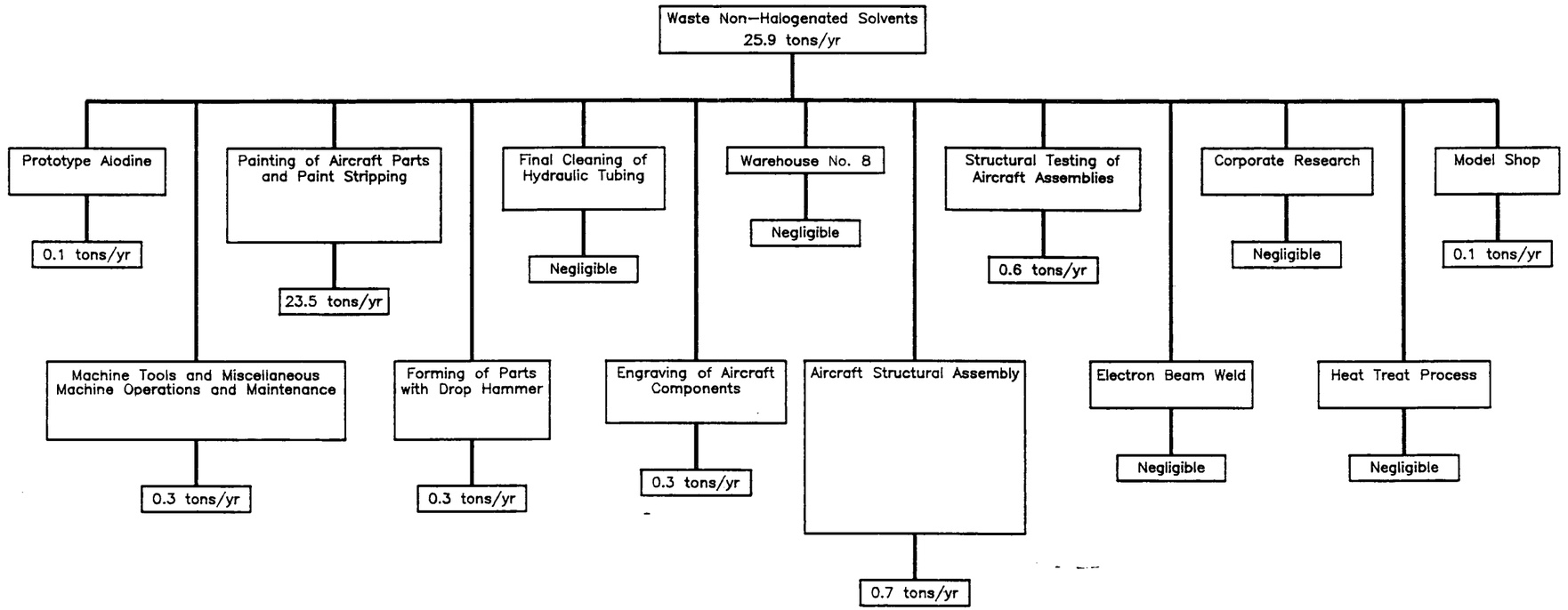
WASTE SUMMARY

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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4.3.5.1 - Paint Mixing Operation - In Warehouse 8, sealants are mixed to be used in other locations at the Bethpage facility. After a batch of sealant has been mixed the equipment is cleaned using toluene. The spent solvent is drummed and shipped off-site for disposal.

4.3.6 Paint Trays and Filters (D006, D007)

Figure 4-7 shows a breakdown by process for paint trays and filters at the Bethpage facility.

4.3.6.1 - Painting of Aircraft Parts - Paint trays are used at the Bethpage facility for the spray painting of parts. The trays have wooden frames with a wire mesh within the frame which is typically 3 feet by 2 feet in dimension. The aircraft parts are placed on the trays and spray painted. The trays rest on wooden horses. Over time, the paint trays become coated with an accumulation of paint. After their useful life, paint trays are stored and then disposed of off-site.

Many of the paint booths are equipped with a dry filter exhaust ventilation system instead of water curtains. Over time the filters become clogged with paint particles removed from the exhaust stream. When the ventilation system experiences an excessive pressure drop, the filter media must be replaced. These filters are stored and disposed of off-site.

4.3.7 Paint Dust, Chips and Sludge (D006, D007, D008, F002, F003, F005)

A breakdown of the processes which generated paint dust, chips and sludge at the Bethpage facility is presented in Figure 4-8.

4.3.7.1 - Painting of Aircraft Parts - Painting dust, chips, and sludge are the debris and residues resulting from cleaning operations occurring in the paint tunnels. Paint dust and chips are produced by removing excess paint from the paint tunnel walls and floors that collects from overspray during painting operations. This debris is swept into 55-gallon drums and disposed of off-site.

Paint sludge is also the result of overspray during painting operations. Excess paint and water are collected in troughs located underneath the water curtains in each paint tunnel. The water is drawn off and transported to either IWTF depending on the location of the paint tunnel.

FIGURE 4-7

WASTE SUMMARY

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN

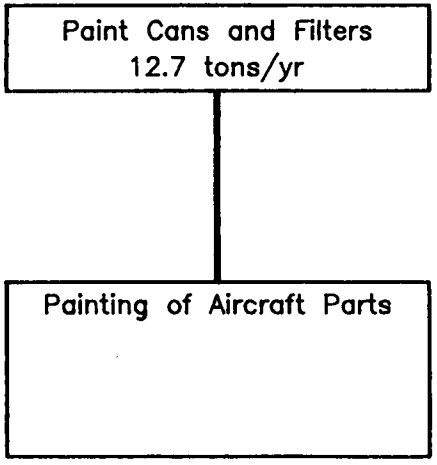

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FIGURE 4-8

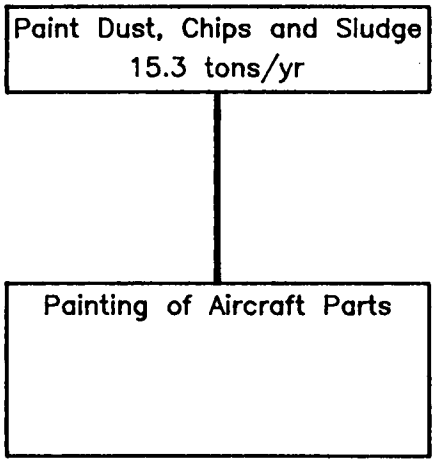
WASTE SUMMARY

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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The remaining residue (paint sludge) is collected in 55-gallon drums prior to off-site disposal by a licensed vendor.

4.3.8 Oil and Water Waste (F002, F003, F005, D001, D004, D006, D007, D008, D035, D040 D018, D022, D028, D029)

Figure 4-9 summarizes the processes at the Bethpage facility which generate oil and water waste. Oil and water waste is generated primarily from the cleaning of heavy machinery and may consist of waste lubricants from cooling and milling operations, waste oil from automobiles, and any miscellaneous oils used on-site. These oils may contain various halogenated solvents, nonhalogenated solvents, alcohol and heavy metals due to contaminated residue in the machinery prior to cleaning operations. Water is present with the oil due to the cleaning of equipment using water soluble oils (cutting oil). The waste oil and water is collected in 55-gallon drums and transported off-site for proper disposal.

4.3.9 Miscellaneous Waste Off-Spec Material

This waste stream consists of off-spec or out-of-date chemicals, paints, and lab packs. All unknown waste is chemically analyzed either by GAC or a New York State certified laboratory. In either case, the wastes are drummed and sent off-site for disposal. Almost all processes at the Bethpage facility produce spent off-specification chemicals. Out-of-date paints and chemicals are removed from warehouse shelves and disposed of off-site. Lab packs include spent lab materials and outdated and spent laboratory reagents that are used in GAC laboratories.

The generation of a significant amount of off-specification waste can be attributed to several factors, namely:

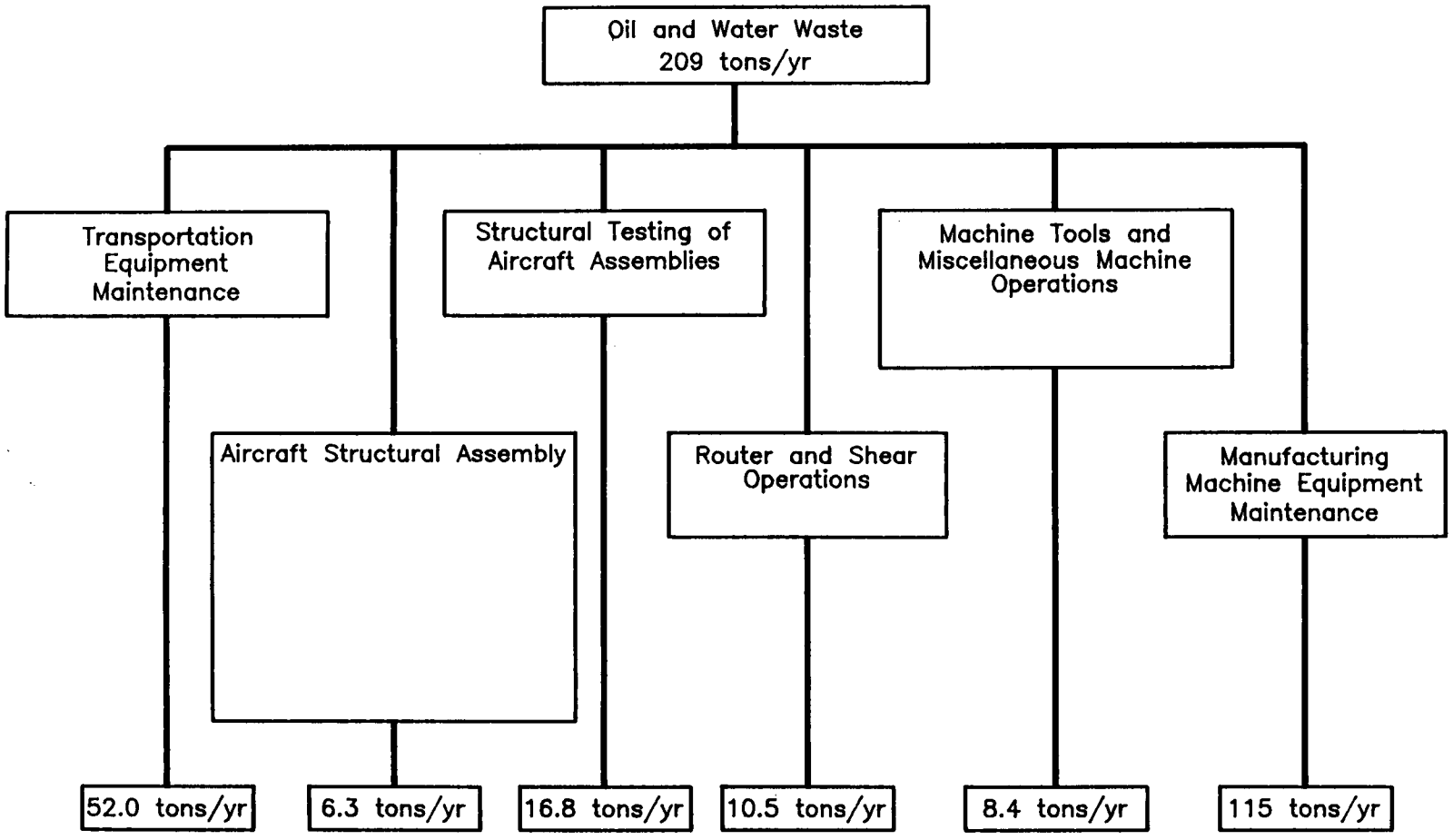
- Various military programs require a certain quantity of materials on hand, such as paints;
- Certain materials are stocked for emergency production or refurbishing;
- Most materials such as aircraft paint have a limited shelf life.

These facts result in a significant quantity of out-of-date materials.

FIGURE 4-9

WASTE SUMMARY

FOR
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



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Section 5

5.0 CURRENTLY IMPLEMENTED WASTE REDUCTION MEASURES

Grumman Aerospace Corporation initiated a hazardous waste minimization program in the early 1970s. The program was designed to address waste generated at all GAC facilities. The motivation for the program included good engineering/manufacturing practices, cost reduction and protection of the environment.

It is important to note that many of the successful waste minimization/reduction projects resulting from this initial program were investigated, designed and implemented prior to the enactment of the Resource Conservation and Recovery Act (RCRA) of 1976 and the provision for enacting a waste minimization program pursuant to the Hazardous and Solid Waste Amendments of 1989. An example of such a project is the design and construction of the Industrial Waste Treatment Facilities which process, on-site over 90% (by weight) of the hazardous waste generated at the Bethpage facility (Metal Finishing Rinse Waters). In addition, waste solvents have been recovered for reuse or for their heating value and GAC procedures now ensure that all new process lines are designed and built to incorporate new waste reduction technologies.

5.1 Description of Existing Waste Reduction Measures

The hazardous waste reduction measures currently in practice or under consideration at the Bethpage facility are outlined in this section. The estimated level of waste reduction provided by each measure is discussed in Section 5.2.

5.1.1 Industrial Wastewater Treatment Facilities

As discussed in Section 4.2, the largest single hazardous waste stream by weight at the Bethpage facility is metal finishing wastewater with approximately 490,000 tons generated during 1990. In the late 1940s and early 1980s, GAC constructed two pretreatment facilities on the Bethpage property to concentrate and neutralize this waste stream. On the average, between 200,000 and 300,000 gallons per day of metal finishing wastewater passes through these pretreatment facilities. A schematic of the process train utilized is shown on Figure 5-1.

Rinse water from the metal finishing operations is treated for chrome reduction. Solids are precipitated out and represent the major portion of this waste stream.

FIGURE 5-1

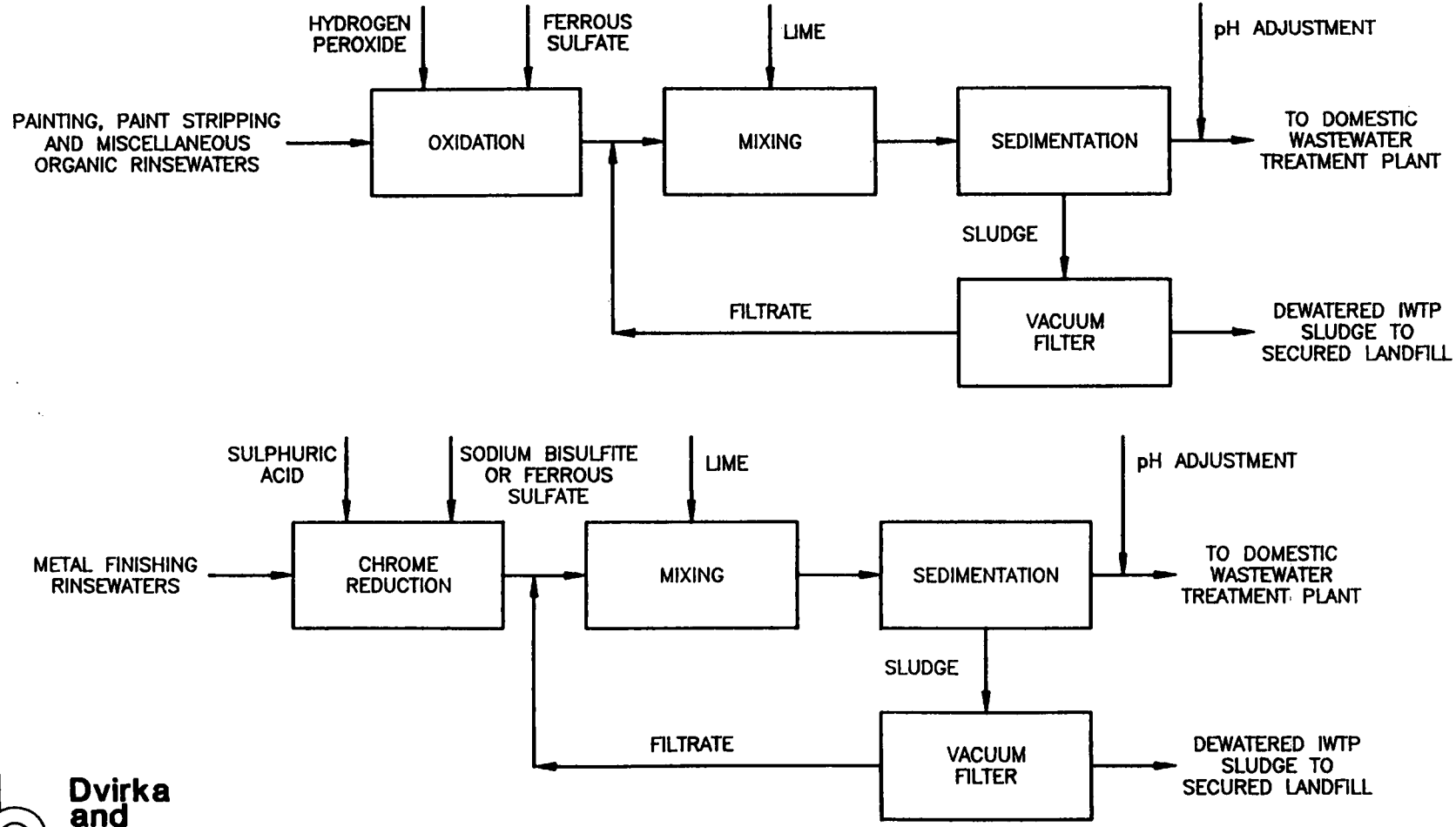
SIMPLIFIED ON-SITE INDUSTRIAL TREATMENT PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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Rinse waters from painting, paint stripping and other processes flow to an oxidation tank where hydrogen peroxide and ferrous sulfate are added to oxidize phenols and other organic compounds in the wastewater. Grumman Aerospace Corporation has also determined that potassium permanganate can be substituted for hydrogen peroxide/ferrous sulfate when phenol concentrations are 100 ppm or less, thereby significantly reducing the quantity of sludge produced. The waste then flows into a mixing tank where lime is added to increase the pH and continues into a sedimentation tank where the insoluble chromium settles out of solution. Following acid addition to neutralize the pH, treated effluent enters the local sanitary sewer system and is combined with domestic waste for treatment at the Cedar Creek Publicly Owned Treatment Works (POTW). Discharges from the Bethpage facility pretreatment plants conform to the pretreatment requirements of the Nassau County Department of Public Works.

Settled sludge containing chromium is pumped from the bottom of the sedimentation tank to a vacuum filter which dewaters the waste to more than 20 percent solids. The dewatered sludge, which is classified as a F019 hazardous waste, is then manifested off-site for proper treatment and disposal. Filtrate from the filter press is returned to the beginning of the process train for additional treatment.

5.1.2 Extension of Process Tank Bath Life

Grumman Aerospace Corporation has instituted a number of programs to minimize waste generation in "bath" processes by extending the life of the process tank baths and at the same time maintaining strict manufacturing specifications for the baths. A typical method utilized to reduce waste is, the installation of a dealuminizer in chromic acid anodizing process line. The dealuminizer utilizes an ion exchange system to maintain the concentration of dissolved aluminum at very low levels, which extends the useful life of the process bath by eliminating the need to dump the concentrated chromic acid tank due to excessive aluminum concentrations.

5.1.3 Counter Flow Rinse Tanks

Beginning in the mid-1970s, counter flow rinse tanks were installed in all new process lines. Rinse tanks must be maintained at specific solids concentration levels. To maintain this level, a continuous feed of clean water is added to the rinse tank. In the counter flow rinse tanks, two rinse tanks are used. The first tank functions as a "gross" rinse tank in that it removes the bulk of material being rinsed off the manufactured parts. The second rinse tank then receives parts that are less contaminated and, therefore, the water in this second tank is maintained at a lower solids concentration. Clean water is fed into the second tank which overflows into the first tank,

overflow from the first tank flows to the on-site wastewater treatment plant. A series of spray nozzles are also utilized to rinse parts as they are removed from the first tank. This rinse water falls back into the first tank. The effect of these spray nozzles is that parts are actually subjected to a triple rinse. The overall benefit achieved in reduction of wastewater generated is attributable to the entire system.

5.1.4 Sodium Hydroxide Etch Solution Reclamation

Grumman Aerospace Corporation researched and developed a process to reclaim spent sodium hydroxide etch solutions. Currently, when the aluminum content of the etch solution exceeds specified limits, a substantial portion of the solution must be dumped and replaced. The proposed regeneration process would eliminate the need to treat the majority of this spent caustic. A plan has been developed to install the necessary reclamation equipment in one of the on-site industrial treatment facilities. A proposal was submitted to the U.S. Navy, the owner of this treatment facility, in September 1982.

In October 1987, the proposal was resubmitted to the Navy with a renewed justification of waste minimization. The most recent response from the Navy indicated that there was no funding available for the proposed project.

The sludge generated in the proposed sodium hydroxide recovery process described above would be mixed with sludge currently generated at the on-site industrial treatment facility. The sludge currently generated is considered a hazardous waste. If the proposed caustic recovery process is implemented, the reclaimed sodium hydroxide sludge produced, when mixed with the sludge generated through the treatment of metal finishing rinse waters, would yield a more stabilized sludge. This stabilized sludge would pass the TCLP test and the sludge could be designated nonhazardous.

5.1.5 Sodium Hydroxide Solution Reuse

In an effort to recycle waste, GAC has listed the waste sodium hydroxide solution generated at the Bethpage site in the Listings Catalog, Northeast Industrial Waste Exchange. Also, the Defense Disposal Agency has attempted to find parties interested in reusing, in a beneficial manner, this spent caustic solution.

5.1.6 Waste Segregation

As discussed in Section 4.2, GAC currently segregates drummed waste into six categories ranging from oil and water waste to halogenated and nonhalogenated solvents. This waste segregation allows the waste to be disposed of by vendors with different material needs. The costs of disposing of segregated wastes are significantly less than disposal costs for combined wastes. Grumman Aerospace Corporation plans to continue this program in the future with additional waste segregation where feasible.

In addition to drummed waste, GAC segregates other bulk waste generated at the Bethpage facility, including freon and trichloroethylene from vapor degreasing operations and waste concentrates such as hydrofluoric acid and sodium hydroxide solutions. Segregation allows these wastes to be treated individually off-site and in the case of the trichloroethylene, allows for off-site reprocessing of the solvent for recycling in lieu of disposal.

5.1.7 Solvent Recovery

Grumman Aerospace Corporation recently put into operation a perchloroethylene vapor recovery system at the Chem Mill Mask exhaust system in the Bethpage facility. Perchloroethylene (PCE) is the solvent in the rubber type coating. The rubber coating, or "mask," prevents the aluminum underneath from being etched during acid treatment, allowing for "pattern etching" on the material. The Chem Mill Mask process is the only area of the Bethpage facility which uses perchloroethylene. Prior to installation of the vapor recovery system, much of the PCE used in the Chem Mill Mask application was exhausted to the atmosphere. This loss to the atmosphere required approximately 500 gallons of virgin chemical addition each week.

The new solvent recovery system consists of three large, horizontal carbon adsorption filters, a steam regeneration system, and a solvent/water separator. Vapor containing volatilized PCE is passed through the carbon adsorbers which retain the PCE on the carbon and allow the treated air to discharge to the atmosphere. Once the adsorption capacity of the carbon filters is exhausted, steam is passed through the unit to remove the PCE from the carbon. The steam/PCE mixture is condensed to a liquid and allowed to separate. The reclaimed PCE is removed from the separator and reused in the Chem Mill Mask Process.

5.1.8 Cadmium Vacuum Deposition

In the late 1970s, GAC installed cadmium vacuum deposition equipment to replace the chemical cadmium electroplating process.

5.1.9 Paint Spray Transfer Efficiency

In the mid-1980s, GAC replaced their conventional paint spray equipment with high transfer efficiency paint spray equipment. This "state-of-the-art" system served to reduce the amount of overspray.

5.2 Estimate of Reduction

The estimated quantity of hazardous waste reduced by the currently implemented waste reduction measures at the Bethpage facility are summarized in this section.

5.2.1 Industrial Wastewater Treatment Facility

Utilization of the on-site treatment facility provides the largest single reduction in hazardous waste currently in place at the Bethpage facility, reducing the approximately 490,000 tons of metal finishing rinse water generated during 1990 to approximately 786 tons of dewatered sludge. This represents a reduction of more than 99% by weight.

5.2.2 Extension of Process Tank Bath Life

It is estimated that the use of the dealuminizer reduces by 20,000 gallons the amount of waste concentrated chromic acid to be dumped each year by extending the life of the bath. In contrast, the dealuminizer system generates approximately 6,000 gallons of waste material relative to the 20,000 gallons saved. However, this 6,000 gallons is treated at the on-site treatment facility and is also an order of magnitude less toxic than the original concentrated chromic acid solution.

The total amount of waste acids sent off-site during 1983 was 908 tons. The amount sent off-site in 1984 was 480 tons representing a reduction of 53 percent. The amount of waste acid sent off-site in 1990 was 210 tons or 76.8 percent less than that sent off-site in 1983.

5.2.3 Counter Flow Rinse Tanks

It is estimated that each counter flow rinse tank reduces the flow by a factor of 10, from roughly 20 gallons per minute to 2 gallons per minute. There are currently eight such rinse tanks operating at the Bethpage facility. Assuming a typical work schedule of 11 shifts per week, the total approximate amount of rinse water saved by these counter flow rinse tanks is 95,000 gallons per week or over four million gallons per year.

5.2.4 Sodium Hydroxide Etch Solution Reclamation

As of this writing, the US Navy has not made funding available for this project. Grumman Aerospace Corporation believes that sodium hydroxide etch solution reclamation is a viable waste minimization technique and will move forward with this project once funding is made available.

5.2.5 Sodium Hydroxide Solution Reuse

Grumman Aerospace Corporation will continue to list this waste in the Listing Catalog of the Northeast Industrial Waste Exchange and through the Defense Disposal Agency; however, as of this writing, no waste caustic solution has been recycled through these organizations.

5.2.6 Waste Segregation

Grumman Aerospace Corporation has realized excellent results from the ongoing waste segregation program. During 1990, a total of 39 tons of waste trichloroethylene, 3 tons of waste freon and 5.9 tons of waste 1,1,1-trichloroethane were sent for reprocessing to an off-site facility.

5.2.7 Solvent Recovery

Grumman Aerospace Corporation is expected to reduce the use of perchloroethylene at the Bethpage facility by more than 80 percent by way of the vapor recovery system installed on the Chem Mill Mask Operation. By capturing and reusing PCE in the process, usage of virgin chemical is expected to drop from approximately 500 gallons per week to less than 50 gallons per week. Although the process has been in operation only for several months, indications are that the system will meet or exceed design expectations.

Section 6

6.0 EVALUATION OF WASTE REDUCTION OPTIONS

As detailed in Section 4.0 of this document, there are a number of hazardous waste streams generated at the GAC facility in Bethpage, New York. Table 4-1 presents a list of each hazardous waste stream including its EPA hazardous waste codes.

Consistent with "The Hazardous Waste Reduction Act" this Plan will address all hazardous waste streams generated in quantities greater than 5 tons per year. The remaining waste streams including descale salt waste, off-site waste, photo waste, and PCBs will not be addressed further in this section.

As detailed in Section 4.2.3 metal finishing rinse water will not be addressed individually since the waste stream is directly tied to the Industrial Waste Treatment Facility sludge addressed in this hazardous waste reduction plan.

Other than the identification and quantification of each hazardous waste stream at the facility, the first step in evaluating options to reduce the generation of hazardous waste was to develop a list of potentially feasible waste reduction measures. Each of these potentially feasible waste reduction measures will be addressed in greater detail below.

6.1 Preliminary Screening of Options

The November 1990 Hazardous Waste Reduction Plan Checklist, published by the NYSDEC Division of Hazardous Substances Regulation, Bureau of Pollution Prevention provides a list of potential options which should be evaluated as part of a Hazardous Waste Reduction Plan. This list includes the following:

1. Substitution of nontoxic or less toxic inputs,
2. Reformulation or redesign of end products to eliminate production inputs,
3. Modification or redesign of production processes/equipment,
4. Changes in material usage, handling and storage practices,
5. Use of closed loop reclamation, reuse or recycling processes to recycle waste directly into the production process, and
6. Use of on-site or off-site recycling technologies.

A preliminary screening analysis indicates that the majority of the above options are potentially applicable at the Bethpage facility on one or more of the identified hazardous waste streams. Table 6-1 presents a summary of the existing hazardous waste streams and the options which were considered to have the potential to provide for significant reduction. The options are listed by the number designations (1-6) given above. A further discussion of each applicable (greater than 5 tons per year) waste stream follows.

Waste Concentrates

The following waste reduction options were considered potentially applicable to the generation of waste concentrates.

- o Substitution of inputs,
- o Modification/redesign of production process/equipment
- o Change in material usage, handling and storage

Reformation/redesign of end products and recycling/reclamation options were not considered to have potential for the following reasons. Military standards hinder modifications to manufactured components due to lengthy investigation and approval processes, and it is not practical to treat these concentrates for reclamation.

Reformulation/redesign of end products was not considered to have potential because of the strict military constraints put on the product design. While these constraints or standards may be altered, the investigation process is lengthy due to government interface. In addition, the results may show that the product cannot be altered.

Recycling and reclamation were not considered to have potential since it is not practical to treat these concentrates for reclamation.

Industrial Waste Treatment Facility Sludge

With the exception of reformation/redesign of end products, all of the six options were considered to have potential for effective reduction of the sludge generated at the Industrial Waste Treatment Facility. Reformation/redesign of end products was screened out, as indicated previously, due to the hindrance of military standards imposed on manufactured components.

Table 6-1

APPLICABILITY OF NYSDEC WASTE REDUCTION OPTIONS TO THE BETHPAGE FACILITY

Waste Stream	Potentially Applicable NYSDEC Options*
Waste Concentrates	3,4
Industrial Waste Treatment Facility Sludge	1, 3, 4, 5, 6
Waste Halogenated Solvents	1, 3, 4, 5, 6
Waste Nonhalogenated Solvents	1, 3, 4, 5, 6
Paint Cans and Filters	1,4
Paint Dust, Chips and Sludge	1,4
Oil and Water Waste	4
Miscellaneous Waste (off specification material)	4

* Summary of NYSDEC Options

1. Substitution of inputs
2. Reformulation/redesign of end products.
3. Modification/redesign of production process/equipment.
4. Change in material usage, handling and storage.
5. Closed loop reclamation.
6. On-site or off-site recycling.

Waste Halogenated Solvents

With the exception of reformation/redesign of end products, all six of the waste reduction options mentioned above were considered to have potential for effective reduction of waste halogenated solvents.

Waste Nonhalogenated Solvents

With the exception of reformation/redesign of end products, all six of the waste reduction options mentioned above were considered to have potential for effective reduction of waste nonhalogenated solvents.

Paint Trays and Filters

The following options were considered potentially applicable to reduction of paint trays and filter waste.

- o Substitution of inputs
- o Change in material usage, handling and storage.
- o Modification/redesign of production process/equipment

Reformulation/redesign of end products was not considered to have potential because of the strict military constraints put on the product design. While these constraints or standards may be altered, the investigation process is lengthy due to government interface. In addition, the results may show that the product cannot be altered.

Reclamation and recycling was considered impractical and not applicable to this waste stream.

Paint Dust, Chips and Sludge

The applicable options for this waste stream and the reasoning for the exclusion of others are the same as those listed above for Paint Cans and Filters. Since the waste is generated as a result of the painting process and cannot be reclaimed, the most effective methods of reducing the waste are to provide a substitution of inputs to change the quality or provide a change in material usage to limit the generation of painting process waste.

Oil and Water Waste

A change in material usage, handling and storage has been considered a potentially effective means of reducing oil and water waste through a more efficient utilization of oil in machining and lubricating processes. Reclamation and recycling of manufacturing and transportation equipment waste oils is being considered as a means of reducing oil and water waste.

The remaining options: input substitution; modification/redesign of production equipment; and reformation/redesign of end products were not considered applicable for the reduction of waste oil due to rigorous physical/chemical requirements of aerospace products.

Miscellaneous Waste

Change in material usage, handling and storage is considered a potentially applicable waste reduction option for miscellaneous waste. Miscellaneous waste is primarily comprised of off-specification material or material which has outlives its shelf life.

The remaining options were not considered applicable for the reduction of miscellaneous waste.

6.2 Specific Options

As mentioned in Section 3.1 of this document, GAC has identified a number of waste reduction measures in the "Planning Stage" of its Waste Reduction Program. While these planned measures are directed at the entire corporation, the majority are directly applicable to the Bethpage facility. This planning stage is part of a formal in-house hazardous waste reduction program which was initiated in April 1991. The goals of this program parallel the findings of the Hazardous Waste Reduction Act in that they intend to reduce the amount of hazardous waste generated by at least 50% by the year 2000.

The in-house program directs engineering personnel familiar with the various process areas to investigate and if found to be effective, implement waste reduction measures.

The initial phase of GAC's ongoing in-house program has been completed, and as a result, a number of potential waste reduction options have been identified. In addition, a number of waste reduction options were identified as part of completing the audit phase of this Hazardous Waste Reduction Plan. A list of the waste reduction options considered viable for Grumman are identified and presented in Table 6-2. Additional information is also presented in EPA Forms titled "Option Generation" and "Option Description," which are located in Appendices C and D, respectively.

A more detailed evaluation of these options, including technical and economic feasibility is currently being undertaken as part of GAC's in-house hazardous waste reduction program. It is, therefore, premature to elaborate on information such as return on investment and performance criteria at this time. However, milestones and completion dates have been established for completing all evaluations and implementing all feasible options. A more detailed description of the engineering evaluations planned for each waste reduction technique screened as a viable candidate along with a schedule appear in the following section (7.0).

Grumman Aerospace Corporation has allocated over 10,000 man-hours for 1991 and nearly 1.5 million dollars in resources over the next several years towards the completion of the tasks outlined in this Plan. Additional manpower and resources will be allocated as required based on the findings of the initial investigations from the numerous waste reduction options.

Table 6-2

LIST OF WASTE REDUCTION OPTIONS UNDER EVALUATION FOR THE BETHPAGE FACILITY

1. Provide coolant substitutes for machining processes that the eliminate the use of chlorofluorocarbons.
2. Phase out machining processes requiring the utilization of chlorofluorocarbons.
3. Prohibit new machining processes requiring chlorofluorocarbons.
4. Provide substitute for chlorofluorocarbons used in cleaning areas.
5. Modify cleaning fluid application equipment.
6. Provide alternate cleaning method in lieu of vapor degreaser operations.
7. Provide substitute paint which does not require hazardous supplements.
8. Provide air tight containers for spent cleaning rags saturated with various hazardous chemicals.
9. Provide substitute paint cleaning solvent.
10. Reclaim paint cleaning solvent.
11. Provide substitute chemical in lieu of chromium compounds.
12. Utilize plastic media blasting in lieu of chlorinated solvents for conducting paint stripping operations.
13. Upgrade holding tanks as required to reduce vaporization of chlorofluorocarbons.
14. Improve inventory control.
15. Provide employee training.
16. Property development and reorganization.
17. Utilize starch polymer blasting in lieu of chlorinated solvents for conducting paint stripping operations.
18. Reclaim trichloroethylene.
19. Revise procedure for final cleaning of various subassemblies reducing or eliminating the use of various hazardous solvents.
20. Improve hazardous material storage facilities to reduce contamination.
21. Segregate waste streams.
22. Revise hydrofluoric acid bath operations.
23. Provide for caustic solution reclamation.

Section 7

7.0 PLANNED WASTE REDUCTION MEASURES

A number of potentially effective hazardous waste reduction options were identified and briefly discussed in Section 6.0. They represent the best candidate options to provide for technically feasible and economically practical waste reduction. EPA Option Generation and Description Forms, located in Appendices C and D and Table 6-2, list the 23 potential waste reduction options identified for further evaluation at the Bethpage facility. Specific tasks for evaluating and implementing these options have been formulated with schedules and milestones discussed in this section. The following subsections present a description of these tasks, a schedule for implementation, an estimate of waste reduction and transference along with a description of the employee training program.

7.1 Tasks for Implementation of Waste Reduction Options

The following tasks have been identified as the most efficient means of undertaking the technical evaluation of the waste reduction options discussed above in order to determine the suitability of each for implementation. Table 7-1 summarizes each of the tasks and provides information on the corresponding waste reduction option applicable. The numbers listed under waste reduction options correspond to those in Table 6-2 and in Appendices C and D. A description of each Task follows.

Task 1 - Improved Tracking of Chemical Utilization

There are a number of hazardous chemicals which have been targeted for improved tracking with respect to utilization. They include the following:

- Perchloroethylene
- Trichloroethylene
- Methyl Chloroform
- Chromium Compounds
- Methyl Ethyl Ketone
- Toluene
- Methyl Isobutyl Ketone
- Xylene
- Chlorofluorocarbons

Table 7-1

TASKS FOR IMPLEMENTATION OF WASTE REDUCTION OPTIONS AT THE BETHPAGE FACILITY

Task	Description	Corresponding Option Number*
1	Improved Tracking of Chemical Utilization	14
2	Reduction of Chlorofluorocarbon Waste Generation in Machining Areas	1, 2, 3
3	Reduction of Chlorofluorocarbon Waste Generation in Cleaning Areas	4, 5, 13, 19
4	Reduction of Hazardous Waste Generated in Vapor Degreaser Operations	6, 18
5	Reduction of Hazardous Material Use in Painting Operations	7
6	Reduction of Hazardous Solvent Use in Cleaning Operations	8, 9, 10
7	Elimination of the Use of Chromium Compounds	11
8	Reduction of Hazardous Material Use in Paint Removal Operations	12, 17
9	Improved Administrative Oversight and Status Tracking of all Program Tasks	1 - 23
10	Personnel Training Program	15
11	Coordinate Property Development and Reorganization with Waste Reduction Measures	16
12	Extension of bath life	22
13	Caustic Solution Reclamation	23
14	Waste Segregation	21
15	Improve hazardous material storage facilities	20

* As listed in Table 6-2 of the GAC-Bethpage HWRP.

- o Hydrofluoric Acid
- o Sodium Hydroxide

As part of this task, GAC personnel will investigate and record the quantity of each chemical of concern and the location where it is utilized. This will enable the identification of high-use areas which can then be investigated further for possible waste reduction measures.

Another goal of this task is to establish a more sophisticated system of tracking the dispensing of these chemicals to the manufacturing areas. This will serve to reduce waste by avoiding the generation of off-specification chemicals which exceed shelf life and require manifesting off-site as a hazardous waste.

Task 2 - Reduction of Chlorofluorocarbon Waste Generation in Machining Areas

The goal of this task is to further restrict the usage of chlorofluorocarbons (ozone depleters). Chlorofluorocarbons such as freon and Genesolv are used in machining processes as coolants. Reduction will take place by either substituting an alternative coolant, by developing more efficient application methods, or by phasing out the manufacturing task and replacement with an alternative process. In addition, this task will attempt to establish a moratorium on new applications requiring this type of coolant.

Task 3 - Reduction of Chlorofluorocarbon Waste Generation in Cleaning Areas

Chlorofluorocarbons such as Freon and Genesolv are used frequently for cleaning purposes. These chemicals are relatively compatible with most materials to which they are applied and are used in manufacturing areas. In addition, the relatively high density of these chemicals make them suitable for removing lightweight oils from tubing. These chemicals are currently used rather liberally for these applications.

The goal of this task is to eliminate or severely restrict the use of these chemicals by establishing a substitute cleaning fluid or by developing more efficient application and control equipment. Reclamation of these chemicals will also be investigated.

Task 4 - Reduction of Hazardous Waste Generated in Vapor Degreaser Operations

Trichloroethylene (TCE) is currently used to clean residual oil contaminants from manufactured/machined parts. Cleaning is accomplished through the condensation of vaporized TCE on the surface area to be cleaned. The condensate is then collected and reused until the solution is considered contaminated and ultimately disposed of.

The goal of this task is to reduce the use of TCE. Options being investigated include utilization of an alternative aqueous cleaning method. Power washers using an aqueous solution may be used for difficult cleaning applications.

Elimination of the source of oil contaminants will also be investigated. Currently, oil is used for corrosion protection and as a lubricant in the forming process of a number of component manufacturing operations. Consideration will be given to a water based substitute.

Tasks 5 - Reduction of Hazardous Material Use in Painting Operations

Current aircraft painting methods utilize hazardous chemicals as supplements to the paint to aid in application or to promote a required coating thickness. Also hazardous chemicals become waste when paint is removed from various parts during paint stripping operations.

The goal of this task is to reduce the use of the hazardous chemicals, namely methyl chloroform (trichloroethane), toluene, methyl ethyl ketone, xylene and chromium compounds. Reduction techniques to be investigated include substitution of new paints which will not require the hazardous chemical supplements.

Task 6 - Reduction of Hazardous Solvent Use in Cleaning Operations

Hazardous solvents, including toluene, methyl ethyl ketone, methyl chloroform (trichloroethane) and methylene chloride are currently used to clean aircraft parts and to clean spray nozzles on painting equipment. Aircraft parts are prepared for painting by wiping with a rag saturated with one of these chemicals. The chemicals vaporize to the atmosphere from the parts and the rags which are often left in the open after use. Paint spray nozzles are cleaned by spraying the solvent through the nozzle with much of the solvent vaporizing to the atmosphere.

The goal of this task is to reduce the use and waste of these chemicals. Possible methods of reductions which will be investigated include changing chemicals to an enzyme or alcohol based solvent, installing air tight containers for saturated rags and capturing chemicals for reuse. Chemicals may be captured through the use of a condensation system or an activated carbon adsorption system.

Task 7 - Elimination of the Use of Chromium Compounds

Chromium compounds are currently used in aluminum deoxiding, anodizing, coating and sealing processes. The goal of this task is to reduce the use of these compounds. It is planned to achieve this reduction through the substitution of alternate chemicals which do not contain chromium compounds. There are a number of proprietary chemicals available for this purpose. These chemicals are planned to be tested for suitability as replacements.

Task 8 - Reduction of Hazardous Material Use in Paint Removal Operations

Methylene chloride and phenols are currently used to remove paint from aircraft components. This is accomplished by liberally applying the paint stripping solution containing these constituents and results in the generation of significant quantities of spent solvent waste.

The goal of this task is to reduce or eliminate the use of these chemicals for this purpose. This is planned to be accomplished by substituting a different process for paint removal. Possible alternate paint removal systems include the use of nonhazardous (environmentally safe) chemical stripping solutions, and mechanical depainting.

Mechanical depainting involves high speed pneumatic spraying of small pellets onto a surface. The impact of the pellets causes the paint to separate from the surface. The paint and pellets are captured together and pneumatically separated. Plastic media and natural polymer starch pellets are being investigated for use in mechanical depainting.

Nonhazardous (environmentally safe) chemical stripping solutions will also be investigated for paint removal from small aluminum parts.

Task 9 - Improved Administrative Oversight and Status Tracking of All Program Tasks

The goal of this task is to oversee the progress of the other Tasks to ensure that the program remains on schedule and budget.

Task 10 - Personnel Training Program

The goal of this Task is to heighten the awareness of GAC personnel that a waste minimization program is in place. The training will serve to educate personnel on which chemicals are regulated as hazardous material, the importance of waste reduction, general waste reduction procedures, and the applicable regulations and how they affect GAC. In addition, personnel will be trained to reduce the amount of material incorrectly disposed of as hazardous waste.

Task 11 - Coordinate Property Reorganization with Waste Reduction Measures

As a result of changes in manufacturing priorities, GAC is currently reorganizing property at the Bethpage facility, which, when completed, may result in a reduction of a number of hazardous waste streams through more efficient operations. In addition, approximately 200 acres of the Bethpage facility property is currently planned for development into a new integrated complex with associated retail and hotel facilities. The existing manufacturing operations on the 200-acre site would be eliminated or relocated to another area which may also result in a reduction of a number of hazardous waste streams.

Task 12 - Extension of Bath Life

The goal of this task is to reduce "dragout" and chemical loss from solutions in process tanks, particularly for hydrofluoric acid. Loss of solution reduces the tank level and strength and requires the addition of new acid. Options to be investigated as possible means of reducing dragout and chemical loss are tank covers, slower removal, multiple rinse tanks, and alternate rinse systems such as fog and spray units.

Task 13 - Caustic Solution Reclamation

Grumman has researched and developed a process to reclaim spent caustic solutions and a plan for installation has been developed. Navy funding is currently unavailable. When funding is made available this program can go into effect.

Task 14 - Waste Segregation

Grumman Aerospace Corporation currently collects all spent oil and water wastes together to a common tank or drums and transports all of the waste off-site. A portion of this waste is

believed to be nonhazardous, particularly spent lubricating and hydraulic oils and grease. In addition, there is a potential for recycling of this material. Therefore, consideration will be given to segregating these wastes in order to reduce the overall quantity of oil and water type hazardous waste.

In addition, further segregation of hazardous solvents and etchants will facilitate recovery programs currently under review. The enhanced control of the waste stream compositions is expected to reduce disposal costs.

Task 15 - Improved Hazardous Materials Storage Facilities

Provision for secondary containment of all virgin hazardous materials and construction of indoor storage facilities is an ongoing practice at GAC. This serves to avoid container corrosion and physical damage which reduces contamination of the material. Contaminated material is currently transported off-site as off-specification or miscellaneous hazardous waste.

7.2 Implementation Schedule

A project schedule, including a list of activities and planned milestones, has been developed for each of the Tasks described in Section 7.1 and is presented on Figure 7-1.

Task Number 9 provides for project oversight by a single individual and ensures that all other Tasks are implemented. The corporate structure used to implement all Hazardous Waste Reduction Programs was discussed in Section 3.2.

Status of project will periodically be examined by an oversight committee representing both the environmental control and materials processing division.

7.3 Estimate of Reductions

Based on the scope of the tasks and the schedule outlined previously in this Section, GAC plans to reduce the level of hazardous waste generated at the Bethpage facility by 50% by the year 2000. Varying degrees of reduction are expected for different waste streams. There are a total of nine waste streams in this plan as they are generated at a rate of 5 tons per year or more. Table 7-2 shows a summary of the planned reduction for each of the nine waste streams and total figures.

FIGURE 7-1

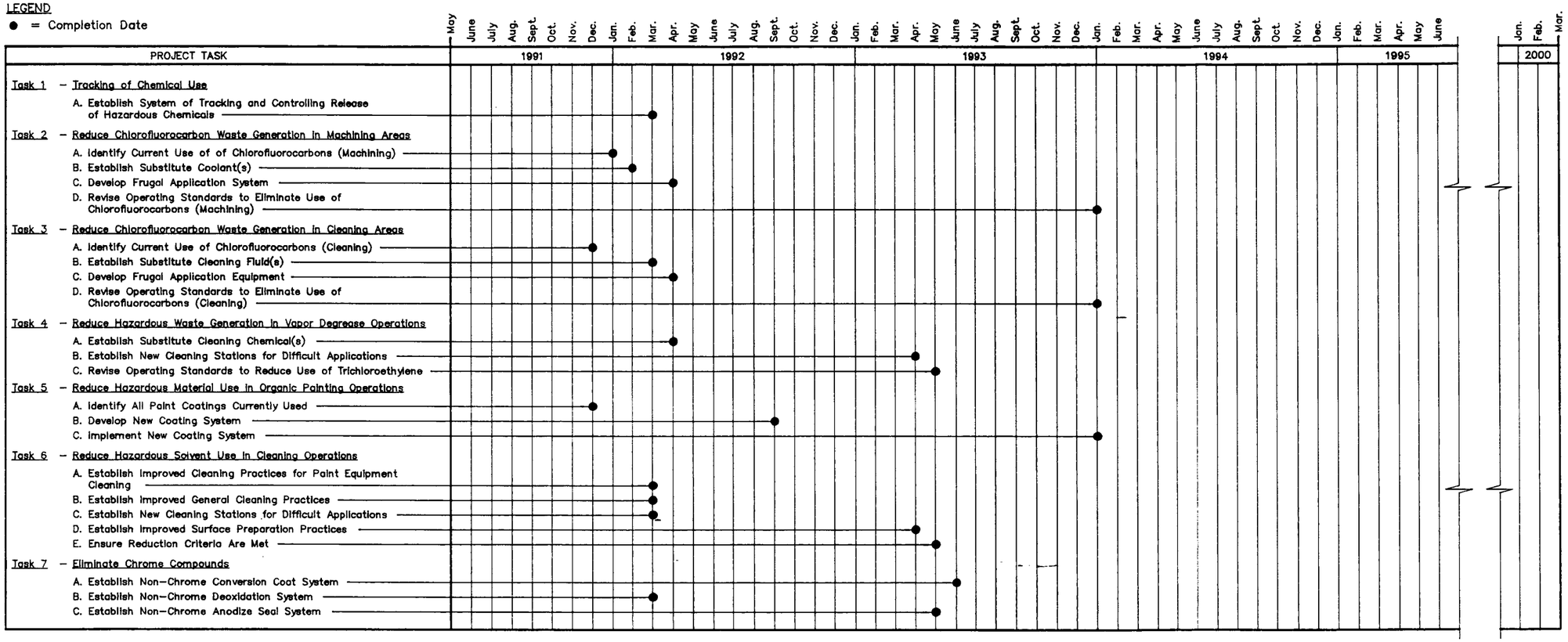
IMPLEMENTATION SCHEDULE

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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Dvirka and Bartilucci
CONSULTING ENGINEERS

FIGURE 7-1 (CONTINUED)

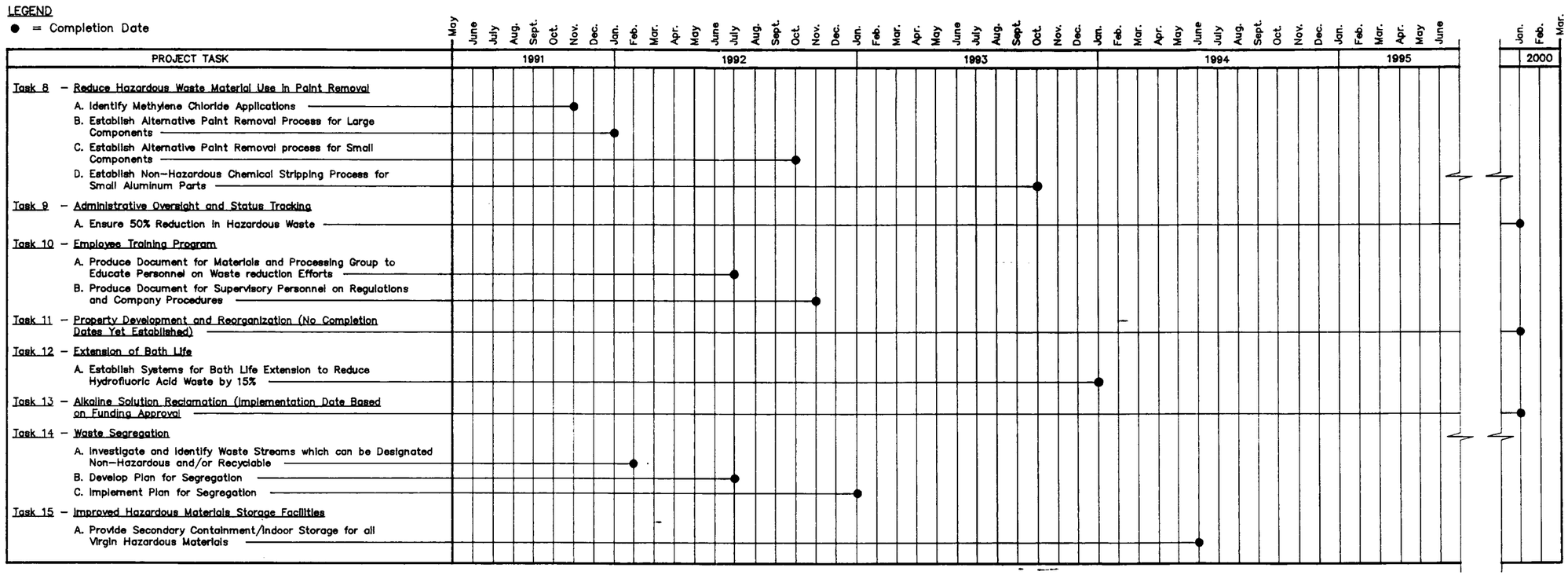
IMPLEMENTATION SCHEDULE

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



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Dvirka and Bartilucci
CONSULTING ENGINEERS

Table 7-2

ESTIMATE OF HAZARDOUS WASTE REDUCTION

Waste Stream	1990 Quantity (tons/yr)	Estimated 2000 Quantity (tons/yr)	Estimate of Reduction (%)
Metal Finishing Wastewater	N/A *	N/A	N/A
Waste Concentrates	1978.7	688.4	65
IWTF Sludge	786.5	589.9	25
Waste Halogenated Solvents	96.2	73.5	23
Waste Nonhalogenated Solvents	25.9	6.1	76
Paint Trays and Filters	12.7	11.4	10
Paint Dust, Chips and Sludge	15.3	13.8	10
Oil and Water Waste	209	167.2	20
Miscellaneous Waste	11.2	10.6	5
TOTAL	3135.5	1560.9	50

*N/A: Waste reduction estimates will be measured against IWTF sludge generation. Since IWTF sludge and metal finishing rinse waters are directly related, all waste reduction techniques which address IWTF sludge will address metal finishing rinse water generation.

Metal finishing wastewater was not listed in the totals since, as discussed previously, although it is generated at the Bethpage facility, it is treated on-site and is concentrated considerably (99% by weight) into sludge. The rinse water waste is reflected in the sludge quantity generated by the Industrial Waste Treatment Facility.

Each of the waste streams are addressed and potentially reduced by a number of the tasks outlined in Section 7.1. Table 7-3 shows a list of which Tasks will address each waste stream and the estimate of reduction by percent for each Task.

The estimates presented were derived from known quantities of input materials and current waste generation figures. Direct calculations in reduction could be made for a number of waste streams. For example, when material substitution was expected, 100% reduction of a chemical to a particular process could be assumed and calculated into the overall reduction. However, certain other process and/or equipment changes required assumptions on percentage of reduction. These assumptions were made based on data from similar changes at other facilities, familiarity with the process, operator input and engineering judgment. In all cases, the estimates reflect the use of all information available at the time of this writing.

7.4 NYSDEC Hazardous Waste Reduction Summary ("Table 2")

The NYSDEC Division of Hazardous Substances Regulation, Bureau of Pollution Prevention checklist for hazardous Waste Reduction Plans requires inclusion of Table 2 from the New York State Waste Reduction Guidance Manual Supplement in this Plan. A completed version of this form is presented in Figure 7-2.

7.5 Estimate of Transference

The hazardous waste reduction plan outlined previously in this section was formulated to reduce the major waste streams by 50% or more through the use of a variety of waste reduction techniques. None of the options which are planned to be studied or implemented are intended to result in a transference of media. The goal of each option is a reduction by quantity. Grumman Aerospace Corporation is attempting, through this plan, to provide for waste reduction without creating additional waste streams in any media. It can, therefore, be stated that it is anticipated that hazardous waste generation will not increase in liquid, solid or gaseous media as a result of the implementation of this Plan.

Table 7-3

ESTIMATE OF REDUCTION BY TASK

Waste Stream	Related Tasks*	Estimate of Reduction (%)
Metal Finishing Wastewater	N/A**	N/A
Waste Concentrates	1	5
	10	5
	12	1.5
	13	53.5
	Total:	65
IWTF Sludge	1	5
	7	15
	11	5
	Total:	25
Waste Halogenated Solvents	1	5
	2	2
	3	2
	4	8.5
	8	0.5
	10	5
	Total:	23
Waste Nonhalogenated Solvents	1	5
	5	65.5
	6	0.5
	10	5
	Total:	76
Paint Cans and Filters	1	5
	10	5
	Total:	10
Paint Dust, Chips and Sludge	1	5
	10	5
	Total:	10
Oil and Water	1	5
	10	5
	14	10
	Total:	20
Miscellaneous Waste	1	1.5
	10	1.5
	15	2
	Total:	5

*Task numbers refer to Tasks identified on Table 7-1.
**N/A: Waste reduction estimates will be measured against IWTF sludge rather than metal finishing wastewater.

Figure 7-2

Company Name: Grumman Aerospace Corporation - Bethpage Facility	EPA I.D. Number NYD002047967

CURRENT
HAZARDOUS WASTE REDUCTION PROGRAM

Table 2

Waste Stream I.D. Number	Name of Waste	Waste Stream Affected	Reduction Plans/Projects	Established Waste Reduction (Tons)	Method Used to Calculate *ROI	ROI (est)	Goal Date	Remarks
1	Waste Concentrates		1 a) Improved tracking of chemical utilization	98.9	**	**	3/92	
			1 b) Personnel training program	98.9	**	**	10/92	
			1 c) Extention of bath life	31.7	**	**	1/94	
			1 d) Caustic Solution Reclamation	1,060.6	**	**	1/00	
2	Metal Finishing Sludge		2 a) Improved tracking of chemical utilization	39.3	**	**	3/92	
			2 b) Elimination of the use of chromium compounds	118.0	**	**	6/95	
			2 c) Personnel training program	39.3	**	**	10/92	
3	Waste Halogenated Solvents		3 a) Improved tracking of chemical utilization	4.16	**	**	3/92	
			3 b) Reduction of chlorofluorocarbon waste generation in machining areas	1.66	**	**	1/94	
			3 c) Reduction of chlorofluorocarbon waste generation in cleaning areas	1.66	**	**	1/94	
			3 d) Reduction of hazardous waste generation in vapor degreaser operations	8.32	**	**	5/93	
			3 e) Reduction of hazardous material use in paint removal operations	0.416	**	**	10/93	
			3 f) Personnel training program	4.16	**	**	10/92	

* ROI = Return on investment
AC = Annualized cost
IRR = Internal rate of return
NPV = Net present value
PP = Pay back period
PI = Profitability index

** Not applicable due to preliminary level and ongoing nature of option evaluation

Source: New York State Waste Reduction Guidance Manual Supplement

Figure 7-2

Company Name:	Grumman Aerospace Corporation - Bethpage Facility	EPA I.D. Number	NYD002047967

CURRENT
HAZARDOUS WASTE REDUCTION PROGRAM

Table 2

Waste Stream I.D. Number	Name of Waste	Waste Stream Affected	Reduction Plans/Projects	Established Waste Reduction (Tons)	Method Used to Calculate *ROI	ROI (est)	Goal Date	Remarks
4	Waste Nonhalo-genated Solvents		4 a) Improved tracking of chemical use	1.8	**	**	3/92	
			4 b) Reduction of hazardous material use in painting operations	19.4	**	**	1/94	
			4 c) Reduction of hazardous solvent use in cleaning operations	0.54	**	**	5/93	
			4 d) Personnel training program	1.8	**	**	10/92	
5	Paint Cans and Filters		5 a) Improved tracking of chemical use	0.635	**	**	3/92	
			5 b) Personnel training program	0.635	**	**	10/92	
6	Paint Dust, Chips and Sludge		6 a) Improved tracking of chemical use	0.765	**	**	3/92	
			6 b) Personnel training program	0.765	**	**	10/92	
7	Oil and Water		7 a) Improved tracking of chemical use	10.5	**	**	3/92	
			7 b) Personnel training program	10.5	**	**	10/92	
			7 c) Waste segregation	20.9	**	**	7/94	
8	Miscellaneous Waste		8 a) Improved tracking of chemical use	0.168	**	**	3/92	
			8 b) Personnel training program	0.168	**	**	10/92	
			8 c) Improved hazardous material storage facilities	0.224	**	**	6/94	

* ROI = Return on investment
AC = Annualized cost
IRR = Internal rate of return
NPV = Net present value
PP = Pay back period
PI = Profitability index

** Not applicable due to preliminary level and ongoing nature of option evaluation

Source: New York State Waste Reduction Guidance Manual Supplement

7.6 Employee Training Program

Grumman Aerospace Corporation has allotted time and man-power towards the development of an effective hazardous waste reduction employee training program (see Task 11 in Sections 7.1 and 7.2). The goal of this program includes the following:

- o Heighten the awareness of all personnel as to the efforts the corporation is taking to minimize hazardous waste generation.
- o Educate personnel on the scope of the program as it applies to specific manufacturing units within the company.
- o Educate personnel as to which materials are regulated and the synonymous chemical names by which each can be referred to.
- o Educate personnel on hazardous waste regulations and how they affect corporate policy and production.
- o Educate personnel on proper disposal location and procedures.

These goals will be achieved by utilizing a number of means to present and communicate technical information to the various organization entities within Grumman Aerospace Corporation. For example, operating personnel will most likely be given booklets and reference cards with pertinent information regarding the use of specific substitute chemicals or process modification specific to an individual manufacturing line. Supervising personnel will be provided with detailed information as required to understand the impacts of any technical and.or process modifications under their jurisdiction. In addition, affected personnel will be given specific substitute waste reduction training regarding chemical substitution, process modification or administrative control information.

The above program is currently underway and will be of an ongoing nature. New and existing employees will be exposed to the waste reduction program and continually briefed concerning program modifications and updated information.

Section 8

8.0 INDEXING AND MEASUREMENT PROCEDURE

Hazardous Waste Reduction Plans submitted to the NYSDEC are required to include a method of waste indexing which relates production to waste generation. Theoretically, "waste index" serves as a direct measure of the hazardous waste generated in each facility in relation to a standard "product" produced at that facility and is designed to eliminate fluctuations in waste generation due to increases or decreases in production output.

Unfortunately, practical application of a standardized waste index is difficult for an industry which produces a large number of different products such as GAC. As a highly specialized defense contracting agency, GAC produces a myriad of different product types, styles and sizes, each requiring different production procedures. While the manufacturing processes used for each product are often similar (i.e., metal finishing, painting etc.), the application of these processes and the corresponding generation of hazardous waste are vastly different. Grumman Aerospace Corporation's government and private sector contracts encompass a wide range of manufacturing activities, including:

- o Research and Development
- o Prototype Manufacturing and Testing
- o Aircraft Rehabilitation From Minor Painting Modifications to Complete Overhauling
- o Manufacture and Assembly of Entire Aircraft.

Given the significant variability of production operations at the Grumman Bethpage facility, it is not possible to directly link waste generation with unit production. More sophisticated indexing systems involving man-hour distributions or economic variables may be applicable to the facility; however, a satisfactory evaluation of these alternatives cannot be completed within the compressed schedule associated with the preparation of this waste reduction plan. Grumman Aerospace Corporation recognizes the importance of indexing as a means of monitoring waste reduction and will continue to evaluate alternate indexing methods.

Section 9

9.0 AREAS OF FURTHER STUDY AND CONCLUSIONS

9.1 Areas of Further Study

Grumman Aerospace Corporation's hazardous waste reduction program is in the early stages of development. Most options described in this plan are currently being evaluated and require further study. There are, however, a number of areas which are planned for future study. They include: new chemical substitutes which may become available; new reduction techniques which may become available; and reorganization to facility operations based on future production changes.

New chemical substitutes which may become available include nonchrome paints for aircraft components. While nonchrome paints currently exist, they do not exhibit the required characteristics for the strict specifications required of military aircraft. New developments in the future may produce a nonchrome paint which exhibits the required characteristics and which can be substituted for the currently used chrome paints.

Grumman Aerospace Corporation will continue to try to develop new waste reduction techniques and to monitor experimental waste reduction techniques being developed at other companies. As these techniques become available and if they prove technically feasible and economically practical they will be implemented as required to reach the corporate waste reduction goals.

The Bethpage facility is currently in a reorganization phase based on property development and manufacturing and product changes. As new developments and product changes occur in the future, GAC will continue to reorganize and strive to make operations as efficient as possible. A more efficient operation is expected to aid in hazardous waste reduction.

9.2 Conclusions

It can be concluded from this document that GAC has made a firm commitment towards complying with the goals of the New York State Hazardous Waste Reduction Act. This Plan summarizes a detailed hazardous waste reduction audit, describes numerous waste reduction options and techniques which are already in operation, planned for implementation, and planned for future study and provides a schedule for implementation.

This plan presents a program intended to reduce the total hazardous waste reduction at the Bethpage facility by 50% by the year 2000. This reduction is the maximum that Grumman Aerospace Corporation feels is technically feasible and economically practical based on available options and information. This estimate of reduction will be updated yearly reflecting future information and further study.

Appendix A

APPENDIX A

SIMPLIFIED PROCESS FLOW DIAGRAMS

FIGURE A-1

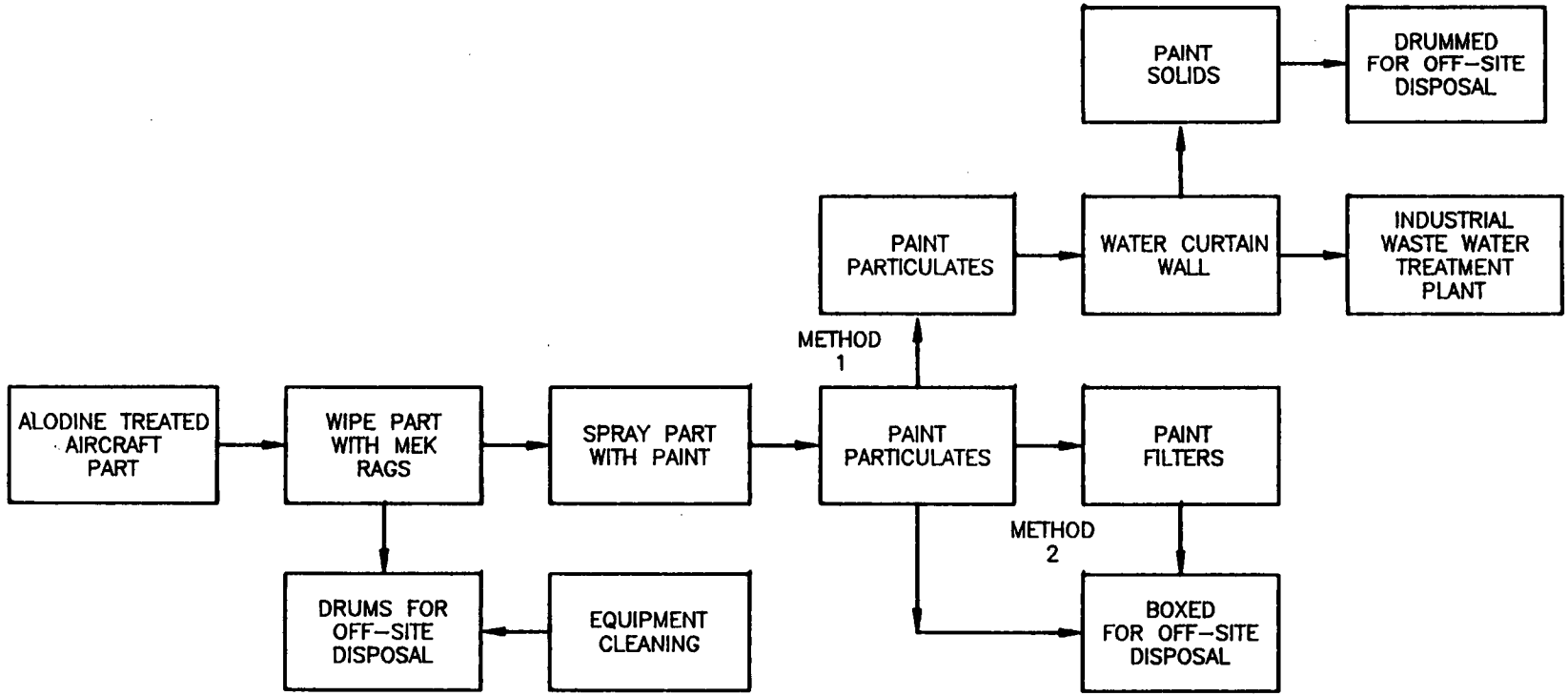
PAINTING PROCESS

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCES13

Dvirka and Bartilucci
CONSULTING ENGINEERS

FIGURE A-2

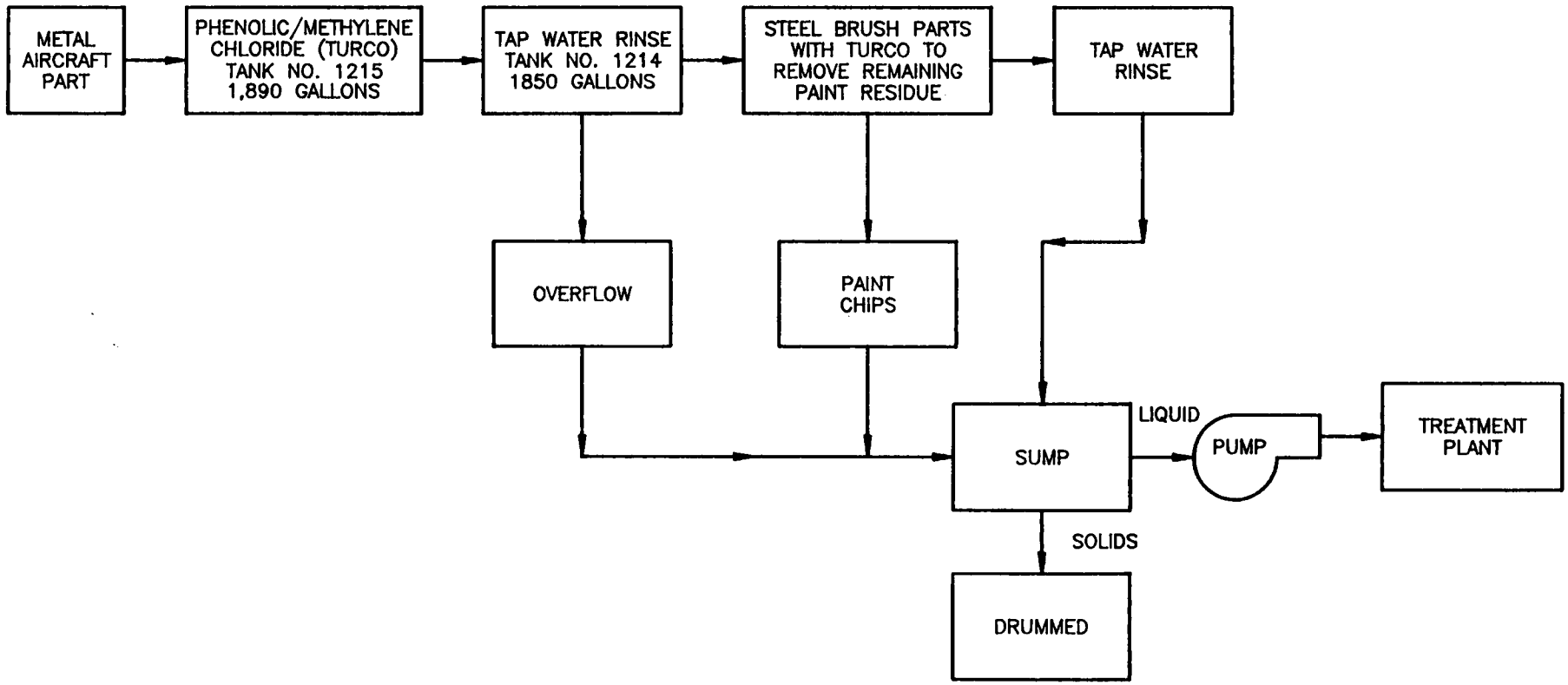
PAINT STRIPPING PROCESS

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCESS

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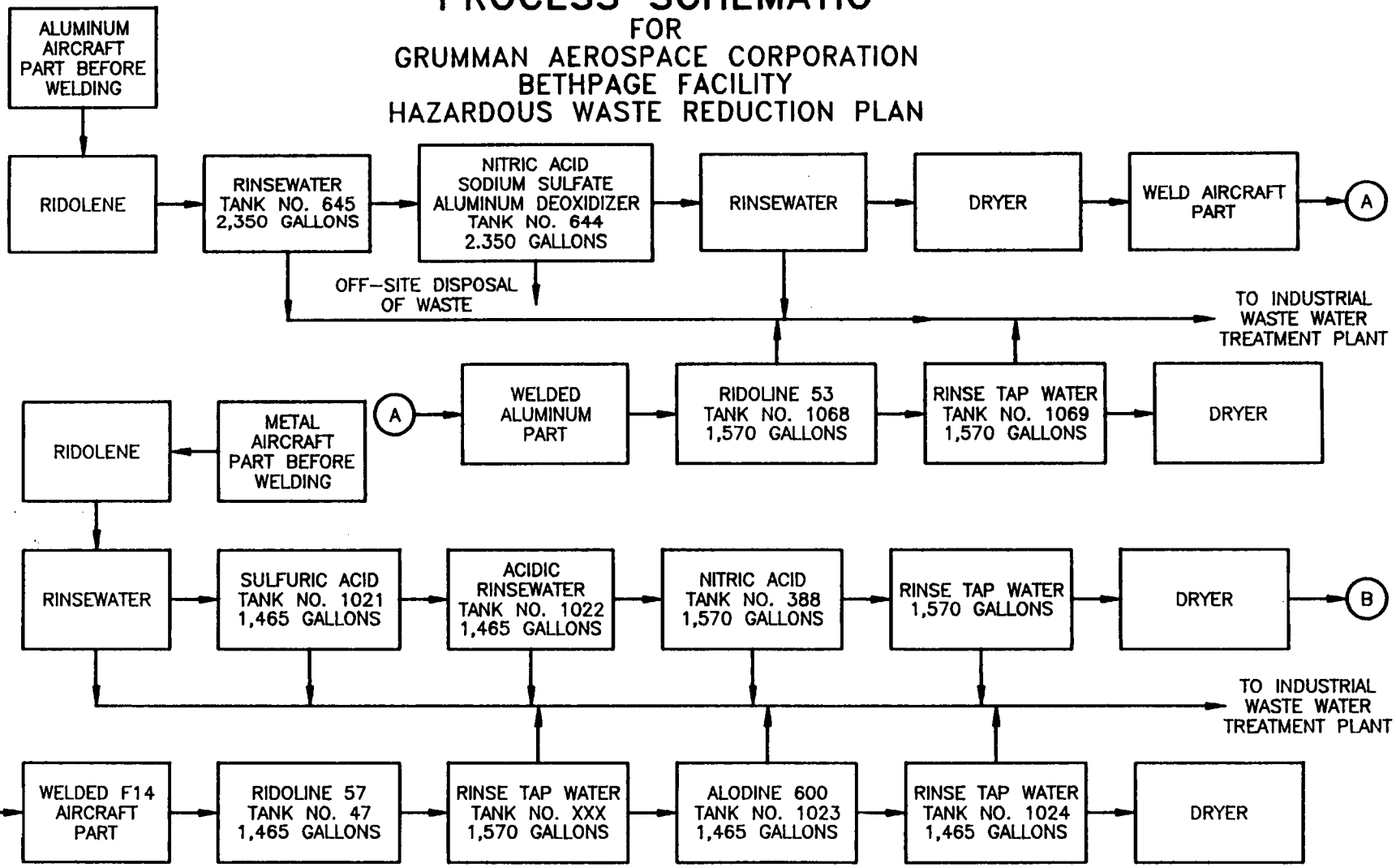
CONSULTING ENGINEERS

FIGURE A-3

CLEANING OF METAL PARTS PRIOR TO AND FOLLOWING SPOT WELDING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCESS13

Dvirka and Bartilucci
CONSULTING ENGINEERS

FIGURE A-4

CHROMIC ACID ANODIZING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

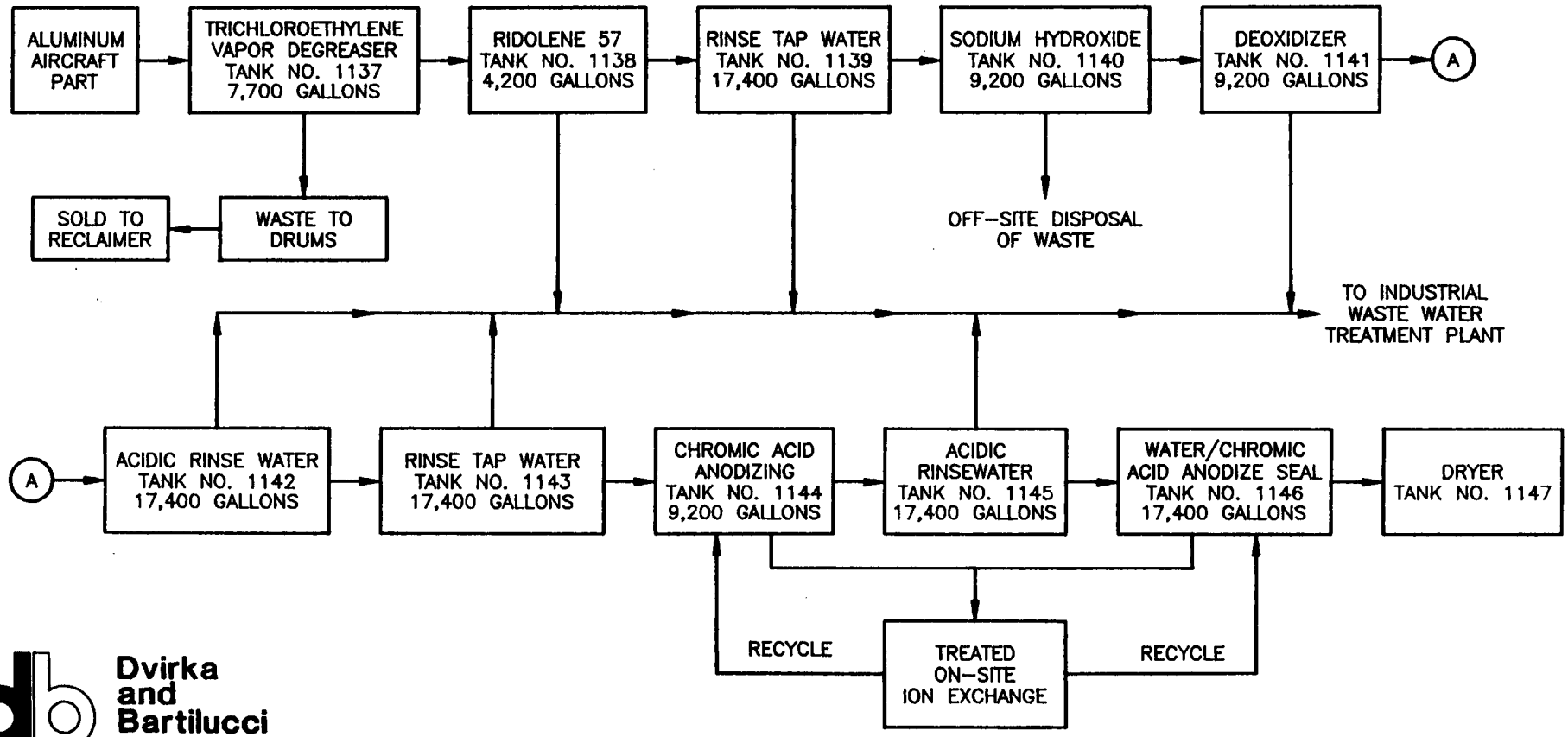


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FIGURE A-5

SULFURIC ACID ANODIZING AND ALODINING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

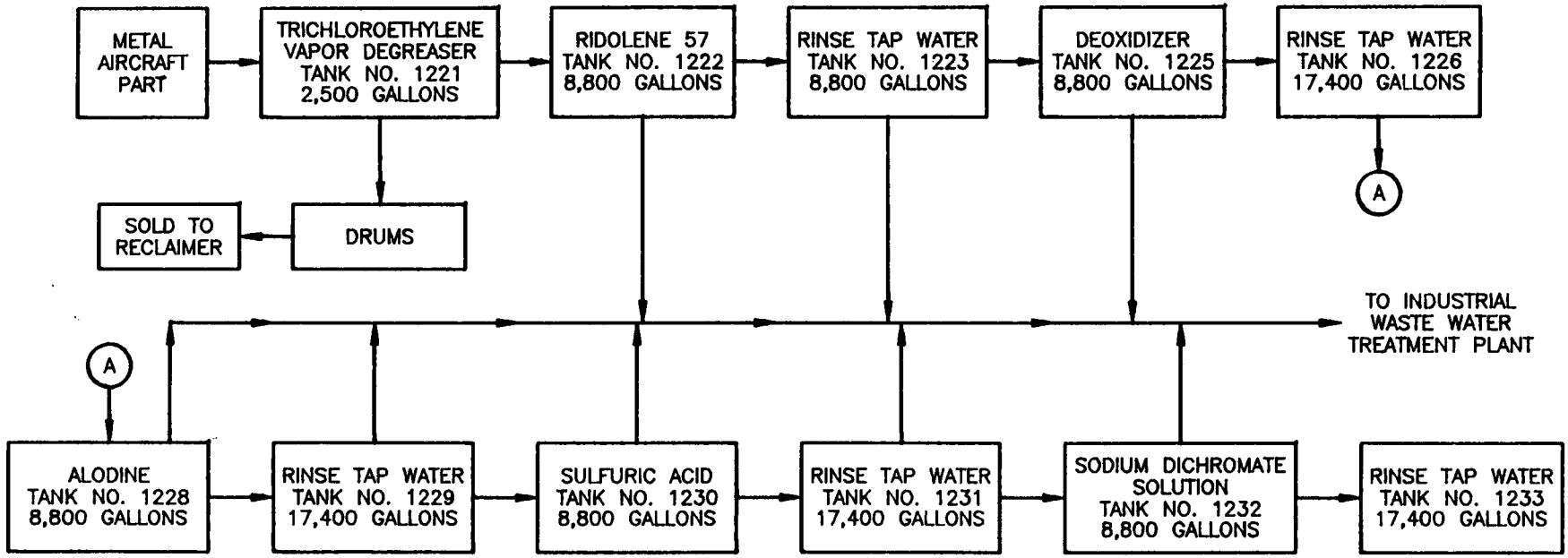

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FIGURE A-6

ALODINING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN

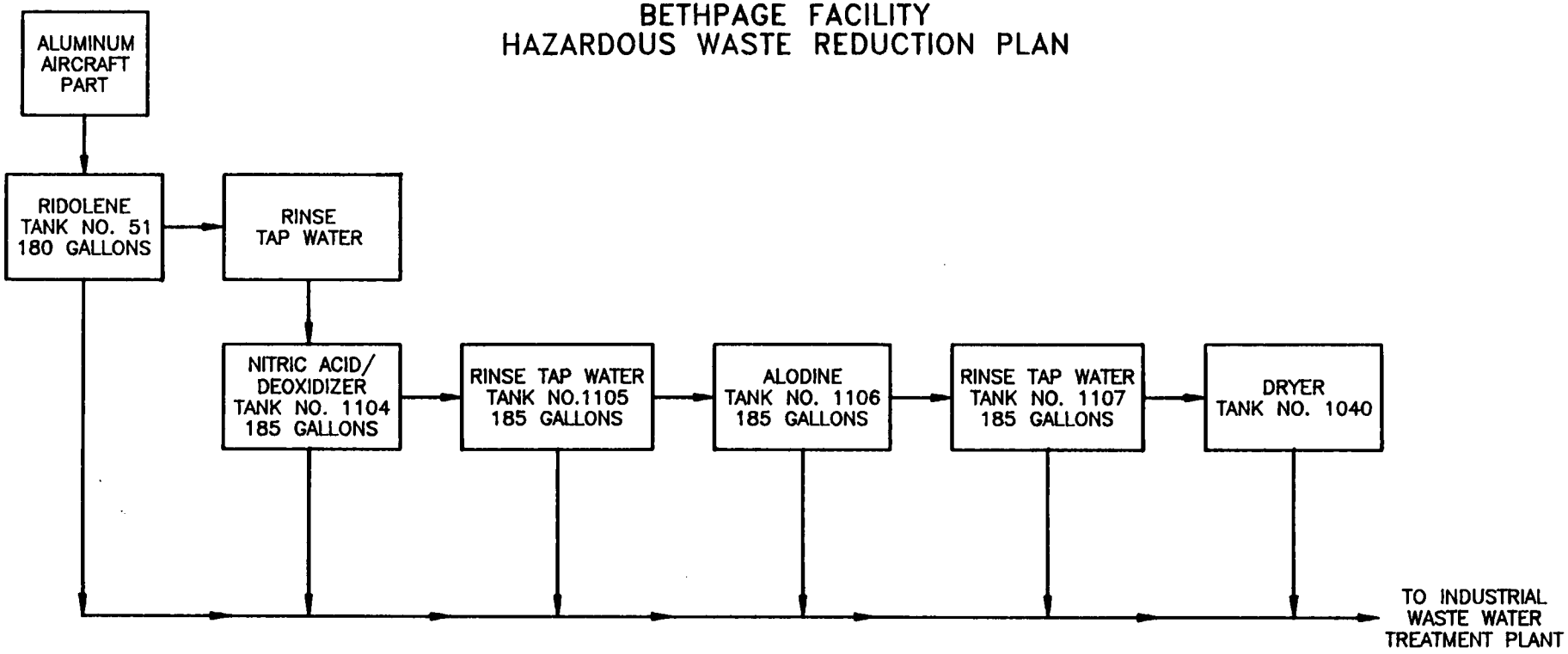

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FIGURE A-7

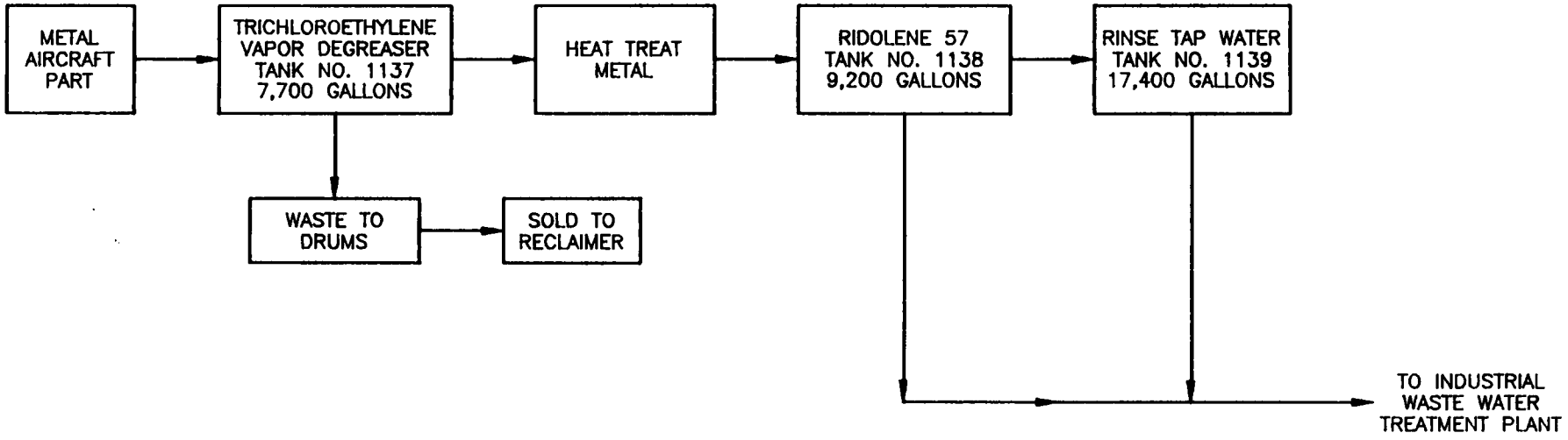
HEAT TREAT PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCESS3

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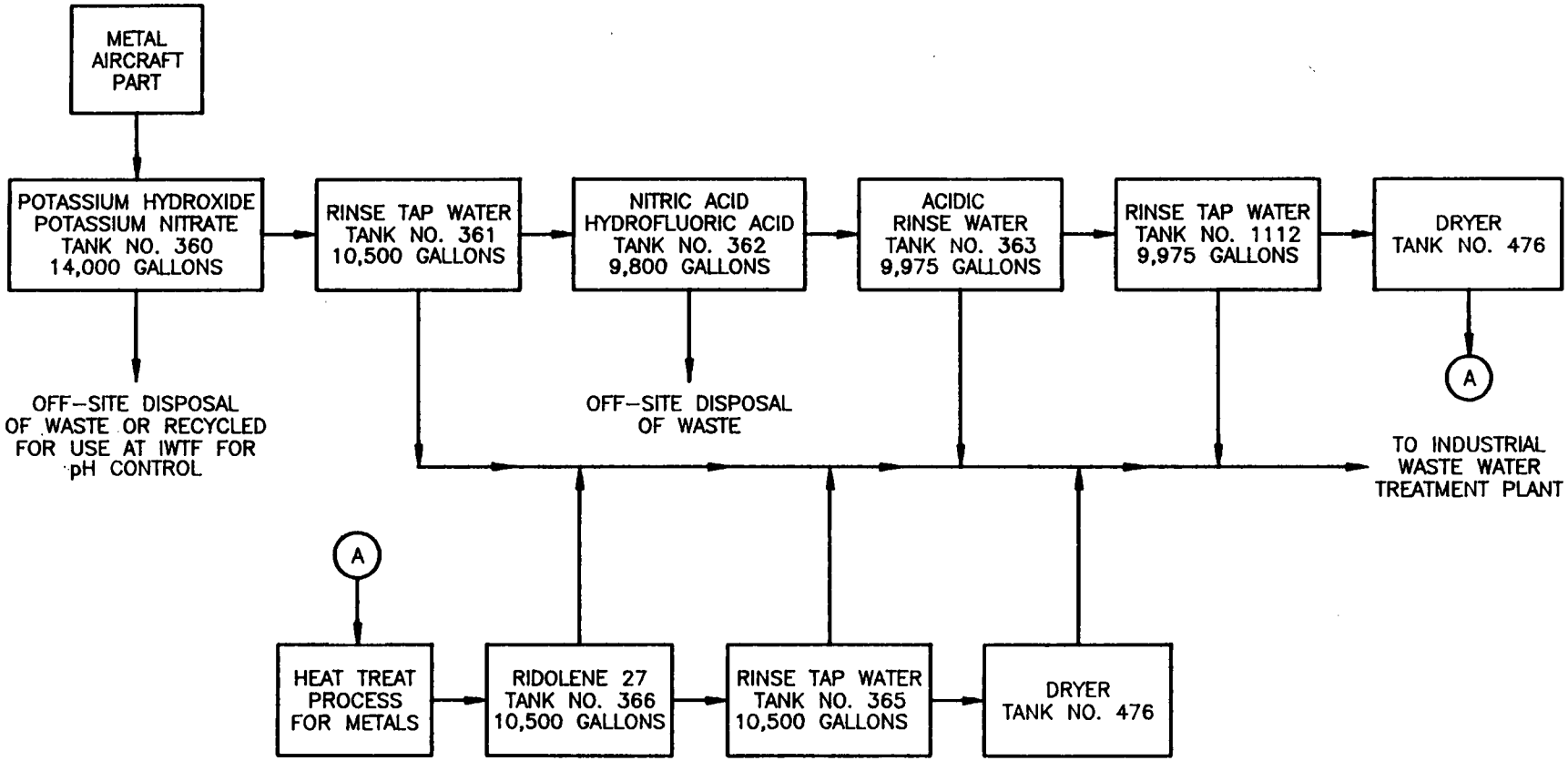
FIGURE A-8

CLEANING AND DESCALING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCESS11

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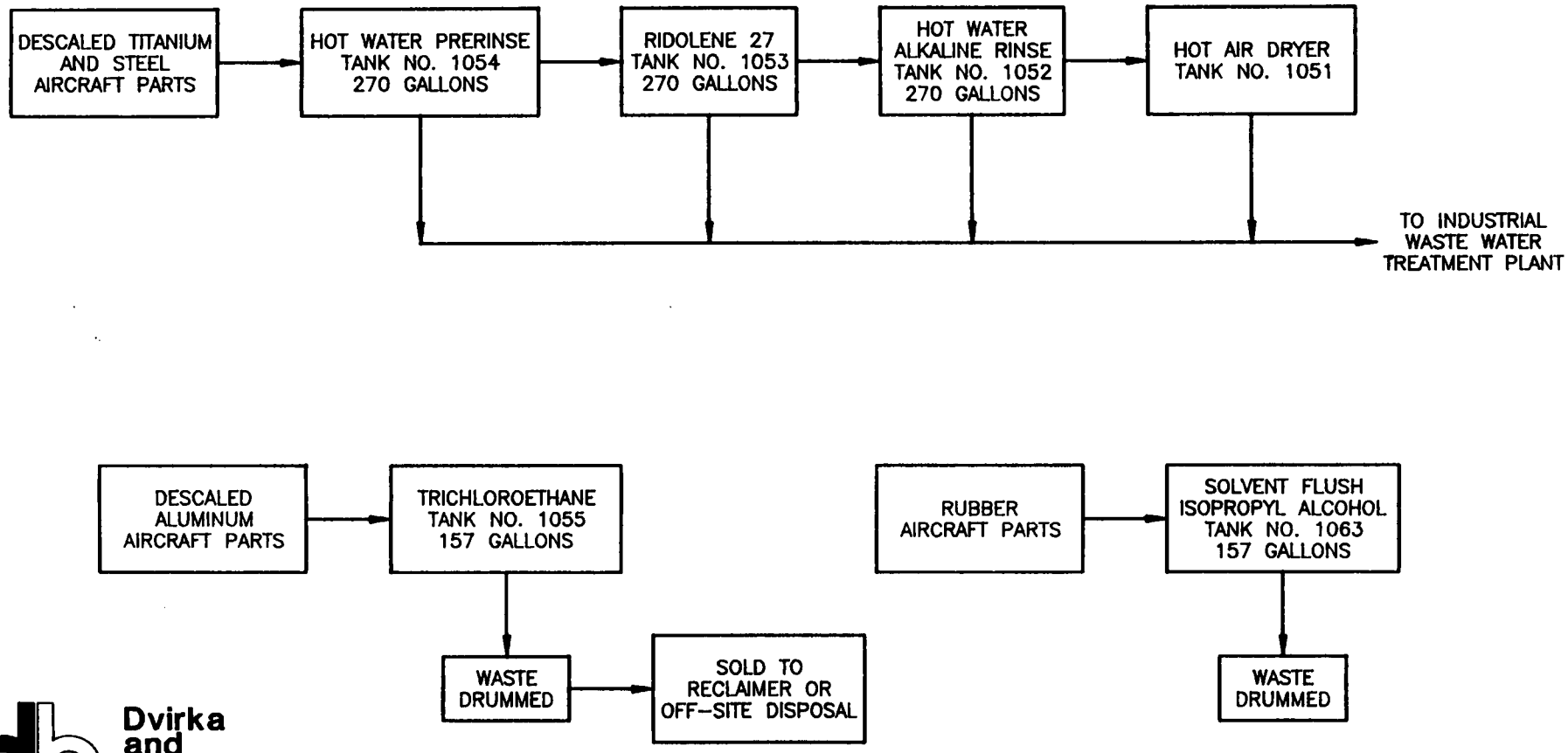
FIGURE A-9

FINAL CLEANING OF HYDRAULIC TUBING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



DIR: 801-TT FILE: PROCESS10

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FIGURE A-10

CHEM MILL MASK APPLICATION AND ETCHING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN

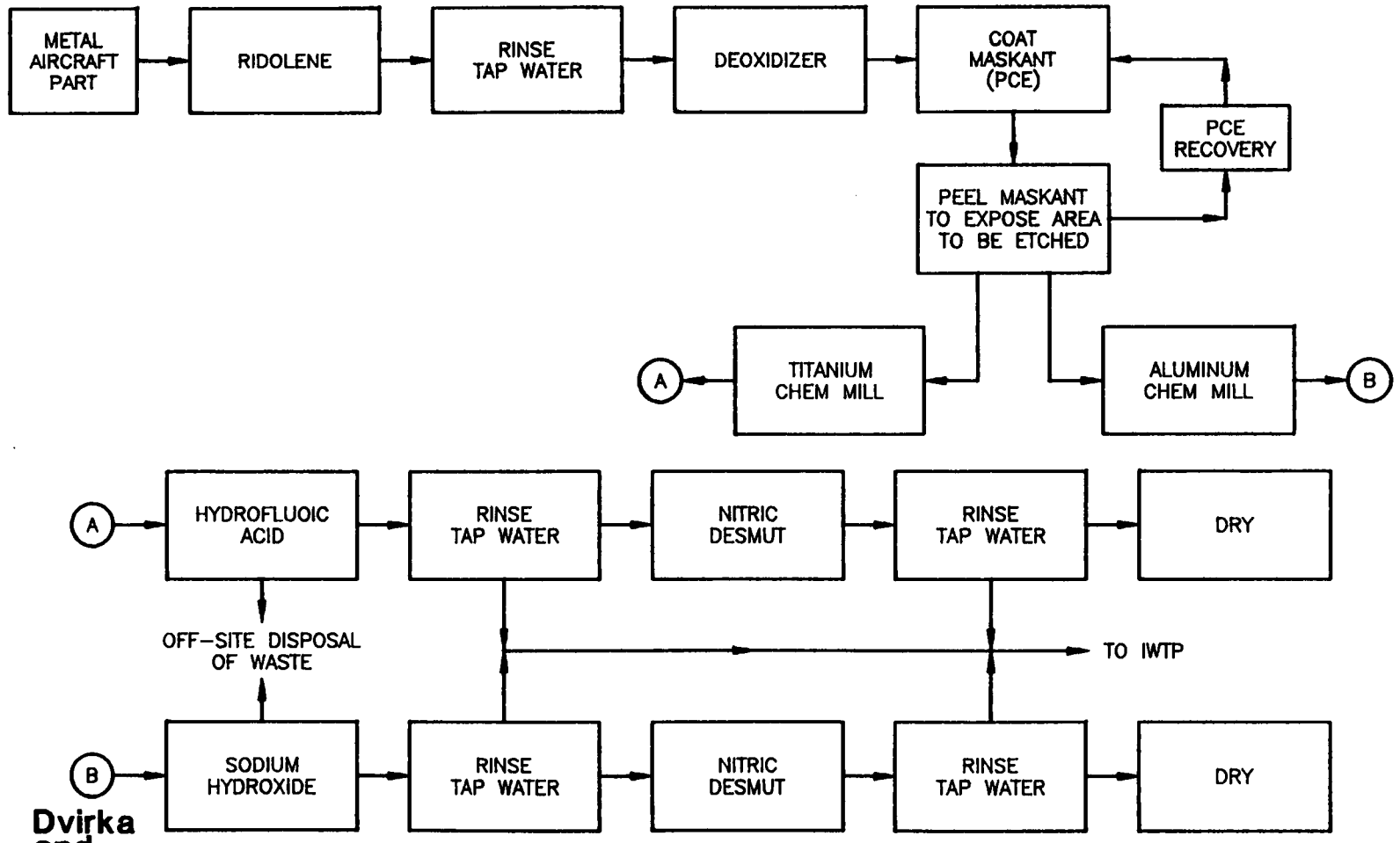

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FIGURE A-11

ZYGLO PENETRANT INSPECTION PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

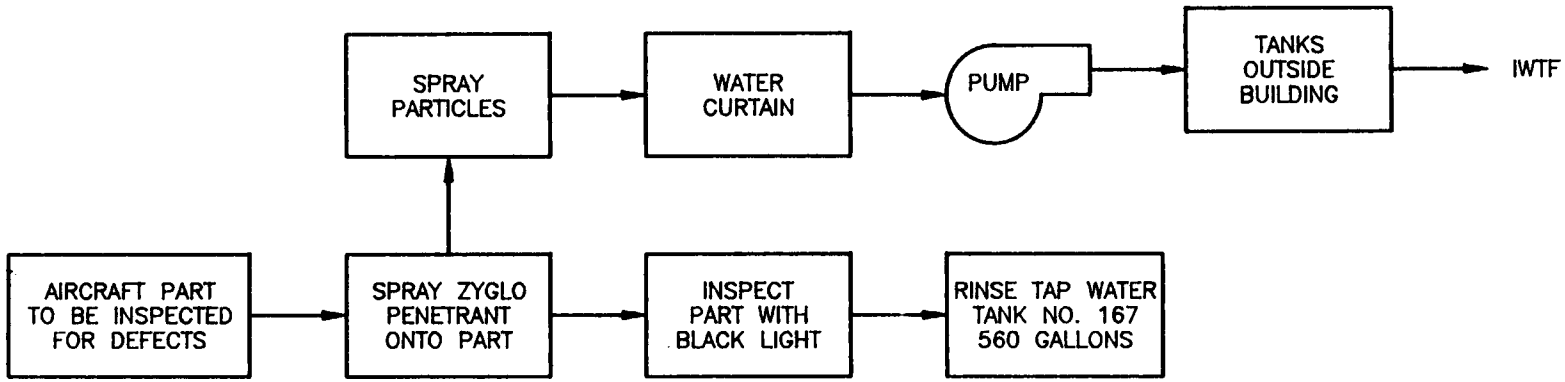

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FIGURE A-12

BRUSH CAD PLATING OPERATION PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION

BETHPAGE FACILITY

HAZARDOUS WASTE REDUCTION PLAN

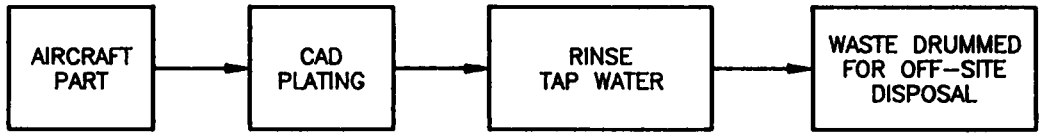

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FIGURE A-13

NITRIC/HYDROFLUORIC ACID DESCALING PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

DIR: 801-TT FILE: PROCESS9

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FIGURE A-14

TRICHLOROETHYLENE VAPOR DEGREASER PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN

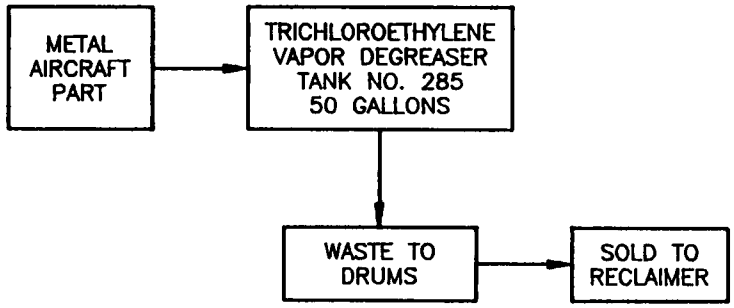

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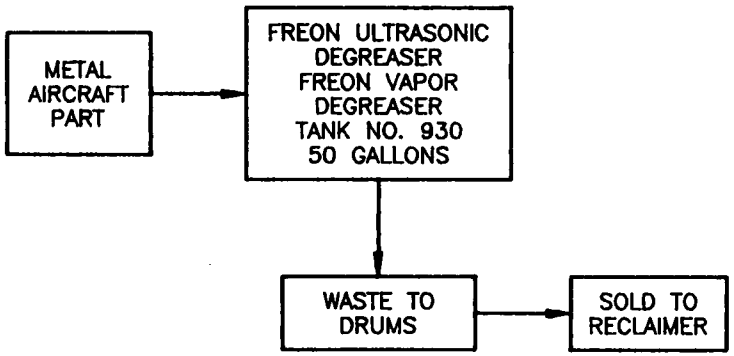
FIGURE A-15

FREON VAPOR DEGREASER PROCESS SCHEMATIC

FOR

GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



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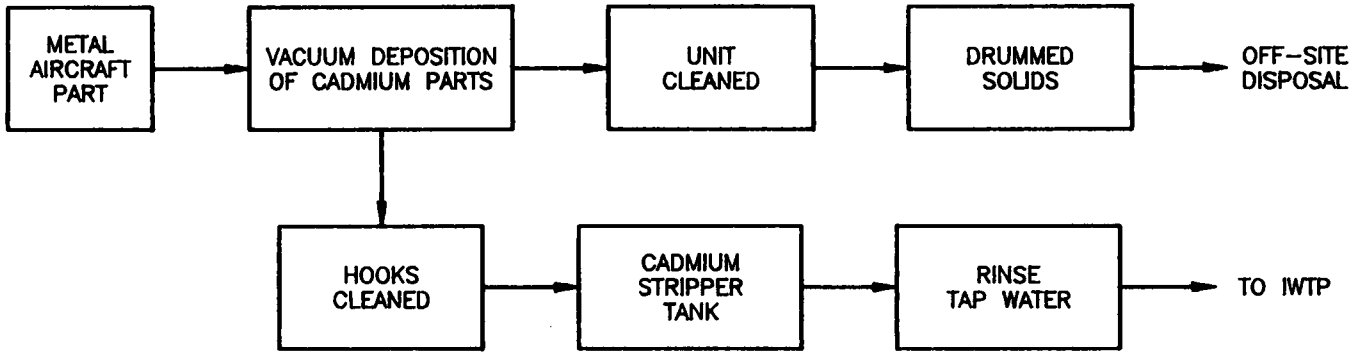
CONSULTING ENGINEERS

FIGURE A-16

VACUUM DEPOSITION OF CADMIUM PROCESS SCHEMATIC

FOR
GRUMMAN AEROSPACE CORPORATION
BETHPAGE FACILITY
HAZARDOUS WASTE REDUCTION PLAN



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CONSULTING ENGINEERS

Appendix B

APPENDIX B

WASTE REDUCTION QUESTIONNAIRE

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Trichloroethylene Vapor Degreasing
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineers	(516) 575-6789
Bob Agee	Environmental Engineers	(516) 575-6196
Mike Noonan	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: The vapor degreasers use trichloroethylene as a cleaning solvent to remove oil, grease and dirt from aircraft parts, specifically hydraulic tubing. The part is placed in a wire basked and lowered into the trichloroethylene vapors. The vapors are restricted from escaping with the use of cooling coils in the upper area of the degreasing tank. The degreasing tank is covered when not in use. Parts and basket come out dry, there is no dripping.

Measure of output for this process:

Dimensions of Operating area:
Width 5'
Length 10'
Height 20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers 1

Specify number of workers by process step, if possible process is used on an as needed basis. One worker at a time uses the tank.

Operations data: Number of days/year N/A and hours/day N/A of operation

(3) Equipment Requirements

Is all work done manually? Yes

If not, describe system used

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process] One 50-gal tank wth TCE, various size wire baskets.

Procedure for cleaning equipment: The tank contents, when contaminated, are pumped into 55 gallon drums. The tank is then refilled with fresh solvent.

Solvent(s) used: None

Quantity:

Percent contamination:

Method of disposal of spent solvent: The contaminated Trichloroethylene gets pumped into 55 gallon drums and is sold to solvent reclaimers.

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Trichloroethylene	Not Available	Vapor Degreaser	5-gal	Not Available	55-gal .drum

Material specifications [for primary materials specified above]

Weight	Information not available at this time	Color	
Heat Resistance		Weight	
Density		Corrosion Resistance	
Other			

Where are materials purchased: Information not available at this time.
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank liquid is low or below required concentration, more trichloroethylene is requistioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials restocked? As needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	No water use		
Outflow			
Recycle			

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not available		

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal	
			Method	Cost
Halogenated Solvent	0.87 tons	Vapor degreaser	Sold to be Reclaimed	$285

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvent	Liquid	Trichloroethylene	90-95%
	Liquid	Oil & water	5 -10%

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name _____
Phone # _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

None

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? When solvent tank is dumped due to excessive contamination.
What is the procedure for arranging for pickup? Facilities arrange pick-up within their own department since they test the concentration of the tank

Are wastes segregated? Yes

(6) Emissions

Average Emissions

Substance	Quantity/yr	Source of Estimate
Information not available at this time		

Has an air permit application been filed? _____
Person responsible: _____
Phone #: _____
Is a copy available? _____

Ventilation
Flow rate _____ (ft/min)
Height of vent stack _____ (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Information not available at this time

Is solvent recovery practiced? Yes

If yes, what method:
- Carbon adsorption
- Condensation
- Distillation
- Other: see section (7) below

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes _____ no

If yes, approach used: All waste trichloroethylene generated is segregated from other waste streams and is sent to an off-site solvent recovery facility for reprocessing. Also, the solvent tank is covered at night to prevent unnecessary evaporation.

Considered successful? X yes _____ no

If yes, why: During 1990, a total of 39 tons of waste trichloroethylene was sent off-site for reprocessing.

If no, why not? _____

What is seen as the main operating constraint? _____

Are there any flow diagrams, specifications, etc. that may be helpful? _____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Freon Vapor Degreasing
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineers	(516) 575-6789
Bob Agee	Environmental Engineers	(516) 575-6196
Al Martin	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: The Freon Ultrasonic tank is used to clean tubing lines in aircraft assemblies. The lines are dipped into the tank with a basket and held for 3-5 minutes in the vapors. For stubborn dirt and grease, the part is submerged in liquid Freon that has ultrasonic waves that pass through liquid. Tank is kept covered and locked until needed to prevent unnecessary evaporation.

Measure of output for this process:

Dimensions of Operating area: Width 5'
Length 10'
Height 15'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers 5 workers seen in room at time of interview
Specify number of workers by process step, if possible Tank is used as needed. It is kept covered and lock sealed until used.

Operations data: Number of days/year N/A and hours/day N/A of operation

(3) Equipment Requirements

Is all work done manually? Yes
If not, describe system used

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process] one 50 gallon tank with Freon, various size wire baskets

Procedure for cleaning equipment: Tank contents, when contaminated, are pumped into 55 gallon drums. The tank is then refilled with fresh solvent.

Solvent(s) used:
Quantity: None
Percent contamination:

Method of disposal of spent solvent: No spent solvents. All loss is due to evaporation.

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Freon	Not available	Vapor Degreaser	70 gal.	Not avail.	55 gal. drum

Material specifications [for primary materials specified above]

Weight	Information not availabe at this time	Color	
Heat Resistance		Weight	
Density		Corrosion Resistance	
Other			

Where are materials purchased: Information not available at this time
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank liquid is low, more Freon is requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials restocked? As needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	No water use		
Outflow			
Recycle			

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not Available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal	
			Method	Cost
Halogenated Solvent	0.14 tons	Vapor Degreaser	Drummed	$285

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvent	liquid	Freon	Not avaiable

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name _____
Phone # _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

None

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? _____
What is the procedure for arranging for pickup? _____

Are wastes segregated? Yes

(6) Emissions

Average Emissions

Substance	Quantity/yr	Source of Estimate
No emissions		

Has an air permit application been filed? _____
Person responsible: _____
Phone #: _____
Is a copy available? _____

Ventilation
Flow rate _____ (ft/min)
Height of vent stack _____ (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Information not available at this time

Is solvent recovery practiced? No

If yes, what method: Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes _____ no

If yes, approach used Tank is kept covered and locked when not in use to prevent excessive evaporation. Employees accumulate items to be degreased so that tank is used less often.

Considered successful? X yes _____ no

If yes, why: Less evaporation occurs therefore less freon is used to replenish tank contents.

If no, why not? _____

What is seen as the main operating constraint? _____

Are there any flow diagrams, specifications, etc. that may be helpful? _____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Nitric/Hydrofluoric Acid Descale.
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196
Al Martin	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: A small plastic container is filled with Nitric/Hydrofluoric Acid. Hydraulic tubing used in aircraft assemblies are then placed in the acid to prepare tubing for welding (only tube ends are placed in the acid). The tubing is then neutralized in a water rinse sink. Tubes are made of stainless steel and titanium.

Measure of output for this process:

Dimensions of Operating area: Width 4'
Length 6'
Height 15'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers 3 welders, 1 shift
Specify number of workers by process step, if possible The acid is only used when needed by one worker at a time.

Operations data: Number of days/year N/A and hours/day N/A of operation

(3) Equipment Requirements

Is all work done manually? Yes
If not, describe system used

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process]

Procedure for cleaning equipment:

Solvent(s) used: None
Quantity:
Percent contamination:

Method of disposal of spent solvent: Spent Nitric/Hydrofluoric acid is wasted to 55 gallon drums

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Nitric/Hydroflouric Acid	Not available	Descale	55 gallons	Not available	Not available

Material specifications [for primary materials specified above]

Weight	Information not available at this time	Color	
Heat Resistance		Weight	
Density		Corrosion Resistance	
Other			

Where are materials purchased: Information not available at this time

Contact Name:

Phone Number:

What is the normal procedure for ordering materials? When the nitric/hydrofluonic acid refill drum is empty, more acid is requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials restocked? As needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	Not avail		
Outflow	3,308 tons	Rinse water	Not available
Recycle	N/A		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal	
			Method	Cost
Nitric/Hydrofluoric Acid as a waste concentrate	55 gallons	Descaling	Drummed	$55

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Waste Concentrate	Liquid	Nitric Acid	Not available
		Hydrofluoric Acid	Not available

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name
Phone #

Sketch of Waste Storage Area
(Note size and numbers of different containers)

One 55 gallon drum near process

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? Once per month.
What is the procedure for arranging for pickup? When waste drum is filled, Facilities Dept. is called to pickup wastes.

Are wastes segregated? Yes

(6) Emissions

Average Emissions

Substance	Quantity/yr	Source of Estimate
Information not available at this time		

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate (ft/min)
Height of vent stack (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Information not available at this time.

Is solvent recovery practiced? N/A

If yes, what method: Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes _____ no

If yes, approach used The nitric/hydrofluoric acid is used only when needed to minimize waste. And when used it is poured into a small plastic container, just enough to clean tubing ends.

Considered successful? X yes _____ no

If yes, why: Even though this process is small in scale the waste minimization techniques used by Grumman employees are adequate.

If no, why not? _____

What is seen as the main operating constraint? _____

Are there any flow diagrams, specifications, etc. that may be helpful? _____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Final Cleaning of Hydraulic Tubing
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196
Al Martin	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Titanium & steel tubing are cleaned with an alkaline Rinse, the Aluminum tubing cleaned using trichloroethane, and the rubber tubing cleaned using alcohol. The tubes are cleaned of lubicant which is used to bend the tubing

Measure of output for this process:

Dimensions of Operating area:
Width
Length 20'
Height 25'
15'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers 1

Specify number of workers by process step, if possible one man for 1 shift

Operations data: Number of days/year as needed and hours/day as needed of operation

(3) Equipment Requirements

Is all work done manually? Yes

If not, describe system used

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process] 50-100 gallon tanks

Procedure for cleaning equipment: equipment not cleaned

Solvent(s) used: none

Quantity:

Percent contamination:

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
1, 1, 1 - Trichloroethane	Not available	Solvent	87 Gallons	Not available	55 Gallon Drum
Isopropyl Alcohol	Not available	Solvent	75 Gallons	Not available	

Material specifications [for primary materials specified above]

Weight	Information not available at this time	Color	
Heat Resistance		Weight	
Density		Corrosion Resistance	
Other			

Where are materials purchased: Information not available at this time
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When supply drums are low in solvent, more solvent is requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials restocked? As needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	Not available		
Outflow	Not available		
Recycle	Not available		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not available		
[gas]			
[oil]			

(5) **Waste Generation**

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal	
			Method	Cost
Halogenated Solvent	2.3 tons	Solvent Tank	Sold to be reclaimed	$753
Isopropyl Alcohol	Not available	Tank	Drummed	Not available

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvent	Liquid	1,1,1-Trichloroethane	Not available
Isopropyl Alcohol	Liquid	Isopropyl Alcohol	Not available

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name _____
Phone # _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed and segregated at various collection points within Grumman.

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? Weekly
What is the procedure for arranging for pickup? _____

Are wastes segregated? Yes

(6) Emissions

	Average Emissions	
Substance	Quantity/yr	Source of Estimate
Information not available at this time		

Has an air permit application been filed? _____
Person responsible: _____
Phone #: _____
Is a copy available? _____

Ventilation
Flow rate _____ (ft/min)
Height of vent stack _____ (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Information not available at this time

Is solvent recovery practiced? Yes

If yes, what method:
- Carbon adsorption
- Condensation
- Distillation
- Other: See section (7) below

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ____ no

If yes, approach used: The trichloroethane is segregated, drummed and sent-off site to be reprocessed. The trichloroethane and isopropyl alcohol are sprayed onto the aircraft part so only enough is used to clean part.

Considered successful? X yes ____ no

If yes, why: Approximately 6 tons of trichloroethane in 1990 was reprocessed off-site

If no, why not? ____

What is seen as the main operating constraint? ____

Are there any flow diagrams, specifications, etc. that may be helpful? ____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Paint Shop & Paint Stripping Process
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196
Dick Mosco	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Final painting operations and paint stripping operations and storage of chemicals for painting and stripping.

Measure of output for this process: _____

Dimensions of Operating area: Width 100' includes 2 painting bays
Length 250'
Height 20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers 18 between day and night shift (within 5 months the total workers will be 8)
Specify number of workers by process step, if possible Paint as needed
Strip as needed

Operations data: Number of days/year as needed and hours/day as needed of operation

(3) Equipment Requirements

Is all work done manually? No
If not, describe system used For painting there is an air assisted airless equipment by Cremlin that uses 3 pounds of air pressure.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process] various size tanks, paint sprayers

Procedure for cleaning equipment: Lacquer thinner is used to clean the paint sprayers after each batch by having the thinner flow through the paint sprayer system.

Solvent(s) used: _____
Quantity: none
Percent contamination: _____

Method of disposal of spent solvent: _____

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
MEK	Not available	Solvent	582 gallons	Not available	55 gal. drum
Methylene Chloride	Cee Bee C-50	Paint Stripper	421 gallons	Not available	55 gal. drum
Chlorothene	Not available	Solvent	367 gallons	Not available	55 gal. drum
Flow Control	Not available	Equipment	370 gallons	Not available	55 gal. drum
Rags	Not available	Wipe parts	6,000 rags	Not available	small drums
MIBK	Not available	Solvent	61 gallons	Not available	55 gal. drum
Laquer Thinner	Not available	Cleaner	73 gallons	Not available	55 gal. drum
Isopropyl Alcohol	Not available	Solvent	56 gallons	Not available	55 gal. drum

Material specifications [for primary materials specified above]

Weight	Information not available	Color	
Heat Resistance	at this time	Weight	
Density		Corrosion Resistance	
Other			

Where are materials purchased: Information not available at this time

Contact Name:

Phone Number:

What is the normal procedure for ordering materials? When low on materials, the paint shop locker room obtains SAC cards for any material needed. Sac cards are an in-house inventory control system.

How often are materials restocked? As needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	Not available		
Outflow	21,524 tons	Rinse water	Not available
Recycle	Not available		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Disposal Cost
Paint Sludge	1.3 tons	Paint Room	Drummed	$338
Metal Finishing Sludge	34.08 tons	Treatment Plant	Landfill	$10,582
Paint trays & filters	1.1 tons	Paint operation	Drummed	$746
Halogenated solvents	2.8 tons	Paint strippers	Drummed	$917
Nonhalogenated solvents	2.0 tons	Cleaners	Drummed	$8,216

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Major Constituents Concentration
Paint Sludge	Sludge	Halogenated Solvents	Not available
		Nonhalogenated Solvents	Not available
Metal Finishing Sludge	Sludge	Contains Chromium	Not available
Paint trays & filters	Solid	Contains Chromium	Not available
Halogenated Solvents	Liquid	Methylene Chloride Chlorothene	Not available

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name _____
Phone # _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Waste paint trays and filters, solvents, and paint sludge are segregated and drummed at collection points within the paint shop.

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? Weekly
What is the procedure for arranging for pickup? _____

Are wastes segregated? Yes

(6) Emissions

Average Emissions

Substance	Quantity/yr	Source of Estimate
Information not available at this time		

Has an air permit application been filed? _____
Person responsible: _____
Phone #: _____
Is a copy available? _____

Ventilation
Flow rate _____ (ft/min)
Height of vent stack _____ (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Information not available at this time.

Is solvent recovery practiced? _____

If yes, what method: Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes _____ no

If yes, approach used Spent MEK is used as a rough cleaning solvent on paint hoses. Rags contaminated with solvents are cleaned off-site and can be reused.

Considered successful? X yes _____ no

If yes, why: Spent MEK is reduced from 2 drums per week to one drum per week.

If no, why not? _____

What is seen as the main operating constraint? _____

Are there any flow diagrams, specifications, etc. that may be helpful? _____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Miscellaneous Manufacturing Machine Operations
Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility: Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: These departments cut metal and machine tools. Before metal aircraft parts are cut they are wiped clean with various solvents.

Measure of output for this process: _____

Dimensions of Operating area: Width 25'
Length 25'
Height 20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process steps for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers Not available
Specify number of workers by process step, if possible as necessary

Operations data: Number of days/year as needed and hours/day as needed of operation

(3) Equipment Requirements

Is all work done manually? No
If not, describe system used Various hydraulic machines cut and form metal. The machines use crystal cut fluid which keeps the metal cool for a cleaner cut. The fluid is reused until its properties change.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc. -- dependent on process]

Procedure for cleaning equipment: None

Solvent(s) used: _____
Quantity: _____
Percent contamination: _____

Method of disposal of spent solvent: _____

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Toluene	Not available	Cleaner	0.7 gallons	Not available	55 gal. drum
Varsol	Not available	Cleaner	0.2 gallons	Not available	55 gal. drum
Isopropyl Alcohol	Not available	Cleaner	9.5 gallons	Not available	55 gal. drum
MEK	Not available	Cleaner	1.2 gallons	Not available	55 gal. drum
Trichloroethane	Not available	Degreasing	1.5 gallons	Not available	55 gal. drum

Material specifications [for primary materials specified above]

Weight: Information not available at this time
Heat Resistance: _____
Density: _____
Other: _____
Color: _____
Weight: _____
Corrosion Resistance: _____

Where are materials purchased: Information not available at this time
Contact Name: _____
Phone Number: _____

What is the normal procedure for ordering materials? The stockroom associated with these departments request materials through purchasing department

How often are materials restocked? When needed.

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	Not available		
Outflow	Not available		
Recycle	Not available		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used\Month	Use	Cost
[electric]	Not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal	
			Method	Cost
Halogenated Solvents	3.0 gallons	Degreasing	Sold to be reclaimed	$4
Nonhalogenated Solvents	5 gallons	Cleaning	Drummed	$86
Oil & Water	8.4 tons	Lube	Drummed	$7,258

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvents	Liquid	Trichloroethane	Not available
Nonhalogenated	Liquid	Toluene, MEK, Varsol	Not available
Oil & Water	Liquid	All of the above	Not available

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If so, can we get a copy? Yes
Contact name _____
Phone # _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed and segregated at various collection points within Grumman

What group/department is responsible for picking up wastes? Facilities
Contact Name Barry Andres
Phone Number 516-575-3599

How often are wastes picked up? When drums are full.
What is the procedure for arranging for pickup? Machine Department calls Facilities when drums are full..

Are wastes segregated? Yes

(6) Emissions

	Average Emissions	
Substance	Quantity/yr	Source of Estimate
No emissions		

Has an air permit application been filed? _____
Person responsible: _____
Phone #: _____
Is a copy available? _____

Ventilation
Flow rate _____ (ft/min)
Height of vent stack _____ (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters		Exhaust Filters		Fans		
#	Locations	#	Locations	#	Locations	hp

Is solvent recovery practiced? Yes

If yes, what method:
- Carbon adsorption
- Condensation
- Distillation
- Other: see section (7) below

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ____ no

If yes, approach used: Wastes are segregated. The trichloroethane is sent off-site to be reprocessed. The solvent contaminated rags are sent-off site to be reclaimed and eventually reused.

Considered successful? X yes ____ no

If yes, why: In 1990 alone, 5.9 tons of trichloroethane was reprocessed.

If no, why not? ____

What is seen as the main operating constraint? ____

Are there any flow diagrams, specifications, etc. that may be helpful? ____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Clean and Descale

Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196
George Moles	Dept. Foreman	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Before titanium or steel aircraft parts are to be stress relieved or hot formed, the descaling process removes the scale that has formed on the metal due to oxidation. After part has been heat treated, it is cleaned with an alkaline rinse.

Measure of output for this process: _____

Dimensions of operating area:

Width	25'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 2-3, one shift only

Specify number of workers by process step, if possible: one person at a time uses equipment on an as needed basis.

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: The metal aircraft part is dipped in each tank by an automated system.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]
Various size water rinse tanks, one 9,800 gallon nitric/hydrofluoric acid tank, one 14,000 gallon kolene tank.

Procedure for cleaning equipment: When kolene tank or nitric/hydrofluoric acid tank is tested and is contaminated, the contents are pumped into holding tanks until it's carted away. The tanks are then refilled.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Kolene	not available	Descale	25 gallons	NA	55 gallon drums
Nitric/ hydrofluoric acid	not available	Descale	not avail.	NA	
Aerowash	not available	Rinse	115 gallons	NA	55 gallon drums

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? Information not available at this time.
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? The kolene tank and nitric/hydrofluoric acid tank are refilled from holding tanks located outside of the Plant 2 Building. When the holding tanks need to be replenished, the department where the tanks are located orders more through the purchasing department.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	not available		
Outflow	3,308 tons	Rinse	not available
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Disposal Cost
Kolene	2.43 tons	metal cleaner	tanks	NA
Nitric/ hydrofluoric acid	8.78 tons	descale	tanks	$694
Metal finishing sludge	62.9 tons	treatment plant	landfill	$19,531

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Kolene	liquid	Potassium Hydroxide	not available
		Potassium Nitrate	not available
Nitric/ hydrofluoric acid	liquid	Nitric Acid	not available
		Hydrofluoric Acid	not available
Metal finishing sludge	sludge	Contains Chromium	not available

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are pumped into holding tanks located outside of the building where the process acid bath tanks are located.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to contamination (approximately every 2 years).

What is the procedure for arranging for pickup? Facilities makes arrangement within their department because they test the concentration of the tanks themselves.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartlucci Consulting Engineers

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? **N/A**

If yes, what method: Carbon adsorption
Condensation
Distillation
Other

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: **Grumman saves 95,000 gallons per week or over 4 million gallons per year.**

Considered successful? X yes ___ no

If yes, why?

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Cleaning Metal Parts Before and After Welding

Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196
Tom Schiel	Dept. Head	

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data **[for targeted process within the facility]**

Brief description of process: Metal aircraft parts are cleaned prior to welding and after welding.

Measure of output for this process: _____

Dimensions of operating area:

Width	100'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: not available

Specify number of workers by process step, if possible: one person per start of process line on an as needed basis.

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: The metal aircraft part is dipped in each tank by an automated system.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process] Various size tanks.

Procedure for cleaning equipment: When acid tank contents are tested and found to be contaminated, the acid is pumped out to holding tanks. The tanks are then refilled with fresh acid.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Alodine	NA	Anodizer	NA	NA	55 gallon drum
Nitric Acid	NA	Desmutter	NA	NA	
Sulfuric Acid	NA	Etch	NA	NA	
Nitric Acid/ Sodium Sulfate	NA	Deoxidizer	NA	NA	

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? Information not available at this time.
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When the tank contents are low, the department requisitions the material through SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	not available		
Outflow	833 tons	Rinse	not available
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Nitric Acid	Negligible	Desmutter	Drummed	-
Sulfuric Acid	Negligible	Etch	Drummed	-
Alodine	Negligible	Anodizer	Drummed	-
Nitric Acid/ Sodium Sulfate	Neglibible	Deoxidizer	Drummed	-
Metal finishing sludge	15.8	Anodize	Landfill	$4,906

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Nitric Acid	liquid	Nitric Acid	not available
Sulfuric Acid	liquid	Sulfuric Acid	not available
Alodine	liquid	Chromic Acid	not available
Nitric Acid/ Sodium Sulfate	liquid	Nitric Acid Sodium Sulfate	not available
Metal finishing sludge	sludge	Chromium	not available

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are pumped into holding tanks for off-site disposal.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities makes the arrangement from within their own department since they test the concentration of each tank.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? NA

If yes, what method: Carbon adsorption
Condensation
Distillation
Other

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Grumman has installed counter current flow rinse tanks. Water flows at 2 gallons per minute instead of 20 gallons per minute.

Considered successful? X yes ___ no

If yes, why? Grumman saves 95,000 gallons per week or over 4 million gallons per year.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Aircraft Structural Assembly and Structural Testing of Aircraft Assemblies

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/14/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Sal Stralquadani	Safety Engineer	not available

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Structural testing of aircraft assemblies using hydraulic machining. Before testing each aircraft part, the part is cleaned using various solvents.

Measure of output for this process: _____

Dimensions of operating area:

Width	50'
Length	50'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process steps for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 5

Specify number of workers by process step, if possible: as needed

Operations data: Number of days/year 365 and hours/day 8 of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: Hydraulic testing equipment.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment:

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
MEK	NA	Solvent	7 gallons	NA	55 gallon drums
Chlorothene	NA	Solvent	51 gallons	NA	55 gallon drums
Methylene Chloride	NA	Stripper	44 gallons	NA	55 gallon drums
Varsol	NA	Degreaser	46 gallons	NA	55 gallon drums
CeeBeeC-50	NA	Stripper	116 gallons	NA	55 gallon drums
Trichloro-ethane	NA	Degreaser	284 gallons	NA	55 gallon drums
Freon	NA	Degreaser	121 gallons	NA	55 gallon drums
Isopropyl Alcohol	NA	Solvent	12 gallons	NA	55 gallon drums

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? Information not available at this time.
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? Personnel go to local stockroom with SAC cards or go to Department 046 if materials are not in stockroom.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Disposal Cost
Halogenated Solvents	1.32 tons	Degreaser	Drummed	$432
Nonhalogenated Solvents	0.11 tons	Degreaser	Drummed	$452
Oil and Water Waste	1.92 tons	Lube	Drummed	$1,659

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents: Chemical	Major Constituents: Concentration
Halogenated Solvents	liquid, solid (rags)	Methylene Chloride	not available
		Trichloroethane	not available
Nonhalogenated Solvents	liquid, solid (rags)	MEK	not available
		Varsol	not available
Oil and Water Waste	liquid	all of the above	

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? weekly

What is the procedure for arranging for pickup? Facilities has arrangements to pick up wastes every Saturday.

Are wastes segregated? yes

(6) Emissions Not applicable.

Substance	Average Emissions Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption	_____
Condensation	_____
Distillation	_____
Other	see section(s) below

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: All waste trichloroethylene and trichloroethane are segregated and sent off-site to be reprocessed.

Considered successful? X yes ___ no

If yes, why? During 1990, a total of 39 tons of waste trichloroethylene; 5.9 tons of trichloroethene were sent off-site to be reprocessed.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Alodine Pretreatment

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/14/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Sal Stralquadani	Safety Engineer	NA

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: All aircraft parts to be painted must be pretreated with alodine process. This process is just for aluminum aircraft parts. The alodine applies a chemical coating so that the part has electrical protection and corrosion protection.

Measure of output for this process: _____

Dimensions of operating area:

Width	30'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: as needed

Specify number of workers by process step, if possible: as needed

Operations data: Number of days/year 365 and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: Automated system that lifts baskets with heavy or big parts and dips the parts into the tanks.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment: Tank solution is tested. Either tank contents are reactivated or tank is dumped and refilled.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Nitric Acid/ Deoxidizer	NA	Deoxidizer	NA	NA	55 gallon drum
Alodine	NA	Anodize	NA	NA	55 gallon drum

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank contents are low or below required concentrations, more chemicals as applicable are added to the tanks. Materials are requisitioned through SAC cards. SAC cards are an in-house inventory system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	6.208 tons	Rinse	NA
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Nitric Acid Deoxidizer	0.13 ton	Etch	Drummed	NA
Alodine	Neglible	Anodizer	Drummed	NA
Metal Finishing Sludge	9.83 tons	Treatment Plant	Landfill	$3,052
Halogenated Solvents	0.01 ton		Drummed	$3.50
Nonhalogenated Solvents	0.01 ton		Drummed	$41

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Nitric Acid Deoxidizer	liquid	Nitric Acid	NA
Metal Finishing Sludge	liquid	Chromium	NA
Alodine	liquid	Chromic Acid	NA
Halogenated Solvents	liquid	Cee Bee C-50	NA
Nonhalogenated Solvents	liquid	MEK	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Solvent wastes are drummed and segregated at various locations within Grumman. Acid wastes are pumped into holding tanks.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities makes arrangements within their own department since they test the tank contents.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Locations	Exhaust Filters #	Locations	Fans #	Locations	hp

Is solvent recovery practiced? NA

If yes, what method:

Carbon adsorption	
Condensation	
Distillation	
Other	see section(s) below

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Grumman has installed countercurrent flow rinse water tanks. Water flows at 2 gallons per minute instead of the previous 20 gallons per minute.

Considered successful? X yes ___ no

If yes, why? Grumman saves 95,000 gallons of water per week or over 4 million gallons per year.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Electron Beam Weld

Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Metal aircraft parts are welded by an electron beam for a cleaner, stronger weld. Prior to welding, the metal is cleaned using trichloroethane or MEK.

Measure of output for this process: _____

Dimensions of operating area:

Width	25'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process steps for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 3

Specify number of workers by process step, if possible: One worker operates electron beams.

Operations data: Number of days/year as needed and hours/day as needed of operation. Daily use as needed.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: The aircraft part is secured to electron beam machinery. The beam is guided by a worker.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment:

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
MEK	not avail.	solvent	0.7 gallons	not avail.	10 gallon
Trichloroethane			4.5 gallons	"	55 gallon drum

Material specifications [for primary materials specified above]

Weight	Color
Heat Resistance	Weight
Density	Corrosion Resistance
Other	

Where are materials purchased?
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? Chemicals are retrieved from local warehouse by the use of SAC cards. SAC cards are an in-house inventory system.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	not applicable		
Outflow			
Recycle			

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Halogenated Solvent	0.01 ton	Cleaner	Drummed	$3.50
Nonhalogenated Solvent	negligible	Cleaner	Drummed	-

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Nonhalogenated Solvent	solid (rags)	MEK	NA
Halogenated Solvent	solid (rags)	Trichloro-ethane	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Solvent wastes are segregated and drummed at various waste stations througout Grumman.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? weekly

What is the procedure for arranging for pickup? Facilities pick up wastes every week.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? no

If yes, what method:
Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Solvent contaminated rags are sent off-site to be reclaimed.

Considered successful? X yes ___ no

If yes, why? Rags can be reused.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Zyglo Penetrant Inspection

Audit Team: Andriani Harris
Kathleen Gallagher

Date: 5/2/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Bob Agee	Environmental Engineer	(516) 575-6196

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: The part to be examined is sprayed with a zyglo penetrant. A black light is then used to check for any weld defects and cracks.

Measure of output for this process: _____

Dimensions of operating area:

Width	15'
Length	25'
Height	10'

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: **as necessary**

Specify number of workers by process step, if possible: **as necessary**

Operations data: Number of days/year **as needed** and hours/day **as needed** of operation.

(3) Equipment Requirements

Is all work done manually? **yes**

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment:

Solvents(s) used: _____
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Zyglo Penetrant	NA	inspection	NA	NA	55 gallon drum

Material specifications [for primary materials specified above]

Flash Point	200°F	Color	Green
pH	Neutral	Weight	56.8 lbs/cu ft
Density	0.91	Corrosion Resistance	NA
Other			

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? Inspection Department requisitions the Zyglo through SAC cards.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Zyglo Penetrant	NA	Inspection	Drummed	NA

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Zyglo Penetrant	liquid	Petroleum Distillates	75%
		ILV	10%
		Kerosene	15%

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If, so can we get a copy? Yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Waste is collected and drummed near process.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? as needed

What is the procedure for arranging for pickup? Facilities pick up waste when notified by Inspection Department.

Are wastes segregated? NA

(6) Emissions NA

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp
	NA					

Is solvent recovery practiced? no

If yes, what method:

Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Zyglo penetrant is sprayed on each part so that only enough is used. Waste is kept to a minimum.

Considered successful? ___ yes ___ no

If yes, why?

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Heat Treat Process

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Schilling	Chemical Engineer	(516) 575-9551

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Metal aircraft parts, steel or aluminum, are first cleaned of grease and dirt in a trichloroethylene vapor degreasing tank. The part is then placed in an oven and is heated at high temperatures. The part is then cleaned of aluminum oxides by dipping it into an alkaline cleaner. The heat treat process makes the metal stronger and it also allows the metal to be formed in any way.

Measure of output for this process: _____

Dimensions of operating area:

Width	50'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: as needed

Specify number of workers by process step, if possible: as needed

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: Automated system that lifts and dips large aircraft parts in and out of tanks.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment: When degreaser solvent becomes contaminated, the tank contents are pumped into 55 gallon drums. The tank is then refilled with fresh solvent.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Trichloroethylene	NA	Vapor degreaser	NA	NA	55 gallon drums

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank liquid is low or below required concentration, more trichloroethylene is requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

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Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Halogenated Solvents	1.18 tons	Vapor degreaser	sold to be reclaimed	$386

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvent	liquid	Trichloroethylene	90-95%
	liquid	Oil and Water	5-10%

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are pumped into tank trucks.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When solvent tanks is dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities arranges pick up within their own department since they test the concentration of the tank.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption	
Condensation	
Distillation	
Other	see section(s) below

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: All waste trichloroethylene generated is segregated from other waste streams and is sent to an off-site solvent recovery facility for reprocessing. Also, the solvent tank is covered at night to prevent unnecessary evaporation.

Considered successful? X yes ___ no

If yes, why? During 1990, a total of 39 tons of waste trichloroethylene was sent off-site for reprocessing.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Chromic Acid Anodize.

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Schilling	Chemical Engineer	(516) 575-9551

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Aluminum aircraft parts are anodized with chromic acid. The anodizing applies a chemical coating to the part so that the part has electrical protection and corrosion protection.

Measure of output for this process: _____

Dimensions of operating area:

Width	100'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) **Labor Requirements**

Number of workers: as needed

Specify number of workers by process step, if possible: as needed basis

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) **Equipment Requirements**

Is all work done manually? yes

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process] Various size tanks.

Procedure for cleaning equipment: When degreaser and acid tank contents are contaminated, the contents are dumped and the tanks refilled.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Trichloroethylene	NA	Vapor degreaser	NA	NA	55 gallon drum
Sodium Hydroxide	NA	Etch metal	NA	NA	55 gallon drum
Nitric/Chromic Acid	NA	Deoxidizer	NA	NA	55 gallon drum
Chromic Acid	NA	Anodizer	NA	NA	55 gallon drum

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank contents are low or below required concentration, more chemicals applicable to the process are requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	1,167 tons	Rinse	NA
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Halogenated Solvent	1.18 tons	Vapor degreaser	sold to be reclaimed	$386
Deoxidizer	6.4 tons	Deoxidizer	drummed	NA
Chromic Acid	36.28 tons	Anodize	drummed	NA
Metal Finishing Sludge	1.85 tons	Treatment Plant	landfill	$574

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Halogenated Solvent	liquid	Trichloro-ethylene	NA
Deoxidizer	liquid	Chromic/Nitric Acid	NA
Chromic Acid	liquid	Chromic Acid	NA
Metal Finishing Sludge	sludge	Chromium	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are stored in holding tanks outside of the building where process is located.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities makes arrangement within their own department since they test the tank contents.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Locations	Exhaust Filters #	Locations	Fans #	Locations	hp

Information not available at this time.

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption	_____
Condensation	_____
Distillation	_____
Other	see section(s) below

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: All waste trichloroethylene generated is segregated from other waste streams and is sent off-site for reprocessing. Also, Grumman has installed countercurrent flow rinse water tanks. Water flows at 2 gallons per minute instead of the previous 20 gallons per minute. Lastly, a dealuminizer was installed, thereby extending the process' chromic acid bath.

Considered successful? X yes ___ no

If yes, why? During 1990, a total of 39 tons of waste trichloroethylene was sent off-site for reprocessing. Also, Grumman saves 95,000 gallons of water per week or over 4 million gallons per year. Lastly, the dealuminizer reduces the chromic acid waste by 20,000 gallons per year.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Sulfuric Acid Anodizing

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Schilling	Chemical Engineer	(516) 575-9551

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Steel, titanium and aluminum parts for the aircraft are anodized with alodine. The anodizing applies a chemical coating to the part so that the part has electrical protection and corrosion protection.

Measure of output for this process: _____

Dimensions of operating area:

Width	100'
Length	25'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: as needed

Specify number of workers by process step, if possible: automated system

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: An automated system that is controlled by a central computer is used to dip each part in a tank sequence that has been preprogrammed.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process] Various size tanks.

Procedure for cleaning equipment: When tank contents are tested and found to be contaminated, the tank contents are dumped and disposed. The tanks are then refilled.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Trichloroethylene	NA	Vapor degreaser	NA	NA	55 gallon drum
Deoxidzer	NA	Deoxidizer	NA	NA	55 gallon drum
Alodine	NA	Anodizer	NA	NA	55 gallon drum
Sulfuric Acid	NA	Etch	NA	NA	55 gallon drum
Sodium Dichromate	NA	Anodize seal	NA	NA	55 gallon drum

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank contents are low or below required concentration, more chemicals applicable to the process are requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	1,125 tons	Rinse	NA
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Halogenated Solvent	0.17 ton	Vapor degreaser	sold to be reclaimed	$56
Deoxidizer	6.11 tons	Deoxidizer	Drummed	NA
Alodine	Neglible	Anodizer	drummed	-
Sulfuric Acid	1.0 ton	Etch	drummed	NA
Metal Finishing Sludge	1.78 tons	Treatment Plant	Landfill	$553

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Halogenated Solvents	liquid	Trichloro-ethylene	NA
Deoxidizer	liquid	Nitric Acid	NA
Alodine	liquid	Chromic Acid	NA
Sulfuric Acid	liquid	Sulfuric Acid	NA
Metal Finishing Sludge	sludge	Chromium	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are pumped into holding tanks that are located outside of the building where process takes place.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities makes arrangement within their own department since they test the tank contents.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Locations	Exhaust Filters #	Locations	Fans #	Locations	hp

Information not available at this time.

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption	
Condensation	
Distillation	
Other	see section(s) below

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: All waste trichloroethylene generated is segregated from other waste streams and is sent off-site for reprocessing. Also, Grumman has installed countercurrent flow rinse water tanks. Water flows at 2 gallons per minute instead of the previous 20 gallons per minute.

Considered successful? X yes ___ no

If yes, why? During 1990, a total of 39 tons of waste trichloroethylene was sent off-site for reprocessing. Also, Grumman saves 95,000 gallons of water per week or over 4 million gallons per year.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Chem Mill Mask Application and Ethching Process

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Schilling	Chemical Engineer	(516) 575-9551

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: A chemical mask coating is applied to metal aircraft parts and then peeled in sections where the part will be etched. After etching the metal, perchloroethylene is used to remove the mask.

Measure of output for this process: _____

Dimensions of operating area:

Width	100'
Length	50'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 5

Specify number of workers by process step, if possible: as needed

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? no

If not, describe system used: An automated system dips the aircraft parts in the chemical maskant and etch tanks.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment: When tank contents are tested and found to be contaminated, the tank contents are dumped and disposed. The tanks are then refilled.

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Nitric Acid	NA	Desmutter	NA	NA	55 gallon drum
Hydrofluoric Acid	NA	Etch	NA	NA	55 gallon drum
Sodium Hydroxide	NA	Etch	NA	NA	55 gallon drum
Perchloroethylene	NA	Solvent	NA	NA	55 gallon drum

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When tank contents are low or below required concentration, more chemicals applicable to the process are requisitioned through SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	4,967 tons	Rinse	
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Nitric Acid	13.54 tons	Desmutter	Drummed	NA
Hydrofluoric Acid	8.77 tons	Etch	drummed	$2,111
Sodium Hydroxide	147.33 tons	Etch	drummed	$28,172
Halogenated Solvent	NA	Solvent	PCE Recovery System	NA

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Nitric Acid	liquid	Nitric Acid	NA
Hydrofluoric Acid	liquid	Hydrofluoric Acid	NA
Sodium Hydroxide	liquid	Sodium Hydroxide	NA
Halogenated Solvent	liquid	Perchloroethylene	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? When tank contents are dumped due to excessive contamination.

What is the procedure for arranging for pickup? Facilities makes arrangement within their own department since they test the tank contents.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

Solvent	% Recovery
Perchloroethylene	98

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Perchloroethylene recovery system was installed by Grumman.

Considered successful? X yes ___ no

If yes, why? 98% of the perchloroethylene is recoverable.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Engraving Aircraft Componets

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Schilling	Chemical Engineer	(516) 575-9551
Bill Simpson	Dept. Head-Engraving	NA

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: The engraving department stencil and silk screens aircraft panels and parts. They also make stickers and decals as required by contracts.

Measure of output for this process: _____

Dimensions of operating area:

Width	50'
Length	50'
Height	10'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process steps for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) **Labor Requirements**

Number of workers: approximately 15

Specify number of workers by process step, if possible: not available at this time

Operations data: Number of days/year 365 and hours/day 8 of operation.

(3) **Equipment Requirements**

Is all work done manually? yes

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment: MEK rags are used to clean equipment.

Solvents(s) used: MEK
Quantity: as needed
Percent Contamination: _____

Method of disposal of spent solvent: Solvent-contaminated rags are drummed and sent off-site to be cleaned and reused.

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Acetone	NA	Solvent	18 gallons	NA	1 gallon container
MEK	NA	Solvent	0.7 gallon	NA	1 gallon container
MIBK	NA	Solvent	1.5 gallons	NA	1 gallon container
Isopropyl Alcohol	NA	Solvent	3.9 gallons	NA	1 gallon container
Miscellaneous Photochemicals	NA	Photo process	1 gallon	NA	1 gallon container

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When quantities of various chemicals that are needed in engraving are low, more chemicals are ordered through the use of SAC cards. SAC cards are an in-house inventory control system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Nonhalogenated Solvent	0.02 tons	Cleaner	Drummed	$82
Halogenated Solvent	negligible	Degreaser	sold to be reclaimed	--

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Concentration
Nonhalogenated Solvent	solid	MEK rags	NA
	liquid	Acetone	NA
Halogenated Solvent	liquid	Trichloroethylene	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed and segregated at waste disposal locations in the Engraving Department.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? weekly

What is the procedure for arranging for pickup? Every Saturday wastes are picked up.

Are wastes segregated? yes

(6) Emissions Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Information not available at this time.

Is solvent recovery practiced? yes

If yes, what method:

Carbon adsorption	
Condensation	
Distillation	
Other	see section 7 below

Solvent	% Recovery

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Trichloroethylene is segregated and delivered off-site for reprocessing. Also, solvent contaminated rags are cleaned off-site and reused.

Considered successful? X yes ___ no

If yes, why? During 1990, a total of 39 tons of waste trichloroethylene was sent off-site for reprocessing.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Cadmium Plating Operation

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/3/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Scott Shilling	Chemical Engineer	(516) 575-9551

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Cadmium plating operation for steel bearings and other small parts.

Measure of output for this process: _____

Dimensions of operating area: Width _____
Length _____
Height _____

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

See Appendix A to view process diagram.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 1

Specify number of workers by process step, if possible: one worker as needed

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? yes

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment:

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Cadmium Solution	NA	plating	4 gallons	NA	55 gallon drums

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? When material quantities are low, the local stockroom requests more cadmium by filling out order forms and sending them to the purchasing department.

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Disposal Cost
Cadmium Rinse Water	0.08 ton	Cadmium plating	Drummed	NA
				NA

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Major Constituents Concentration
Cadmium Rinse Water	liquid	Cadmium	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? yes
If, so can we get a copy? yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed and collected at various locations within the Grumman Facility.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? weekly

What is the procedure for arranging for pickup? Wastes are picked up every Saturday at various stations where cad plating is done.

Are wastes segregated? yes

(6) Emissions

	Average Emissions	
Substance	Quantity/yr	Source of Estimate
no emissions		

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Is solvent recovery practiced? N/A

If yes, what method:

Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? ___ yes _X_ no

If yes, approach used:

Considered successful? ___ yes ___ no

If yes, why?

If no, why not? Cadmium plating operation operates on a very small scale. Only trained personnel use the process for optimum results.

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Chemographics
(Photo and Microfilm Area)

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/15/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Mike Westhoff	Building Manager	NA

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Photochemical lab to do publications and reproductions related to aircraft assembly.

Measure of output for this process: _____

Dimensions of operating area:

Width	50'
Length	50'
Height	10'

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process diagrams for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: 20

Specify number of workers by process step, if possible: not available

Operations data: Number of days/year 365 and hours/day 8 of operation.

(3) Equipment Requirements

Is all work done manually? Yes

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]
Various photo developing and processing machines.

Procedure for cleaning equipment:

Solvents(s) used: none
Quantity: _____
Percent Contamination: _____

Method of disposal of spent solvent:

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Miscellaneous photo chemicals, such as developers, fixers, activators, stop bath			NA	NA	1 gallon container

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? Personnel fill out order forms for what is needed and sends forms to purchasing department.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow	NA		
Recycle	NA		

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	Not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Photo Waste	NA	Photo Chemicals	Drummed	NA

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Photo Waste	liquids, solids	Various Photo Chemicals	NA

Has an analysis of the waste been done? Yes
If, so can we get a copy? Yes
Contact name: _____
Phone #: _____

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartlucci CONSULTING ENGINEERS

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed and collected at various locations wherever photo waste is generated.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? as necessary

What is the procedure for arranging for pickup? Facilities picks up wastes when drums are full.

Are wastes segregated? Yes

(6) Emissions Information not available.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Is solvent recovery practiced? Yes

If yes, what method:

Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: Silver recovery system installed for approximately 20 years.

Considered successful? X yes ___ no

If yes, why? The recovered silver is sold to outside interested parties.

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Corporate Research Center Laboratories

Audit Team: Patrick Behling
Kathleen Gallagher

Date: 5/15/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Joe Barrato	Building Manager	NA

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: The Corporate Research Laboratories use various chemicals in small amounts, therefore, there is limited waste. There is no other information available since access to the building was denied.

Measure of output for this process: _____

Dimensions of operating area: Width _____
Length _____
Height _____

Source: New York State Waste Reduction Guidance Manual

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Electronic Instrument Testing

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/15/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Sal Stralquadani	Safety Engineer	not available

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Electronic instruments in aircraft are tested in this department. Before testing, electronic components are cleaned and degreased with Freon or chlorothene.

Measure of output for this process: _____

Dimensions of operating area: Width _____
Length _____
Height _____

Source: New York State Waste Reduction Guidance Manual

Sketch of Process Area

No process diagrams for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) Labor Requirements

Number of workers: as needed

Specify number of workers by process step, if possible: as needed

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) Equipment Requirements

Is all work done manually? Yes

If not, describe system used:

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process] Various electronic testing equipment.

Procedure for cleaning equipment: Freon is used to clean equipment. It is either wiped on or sprayed on the electronic components. Chlorothene is also used.

Solvents(s) used: Freon
Quantity: as needed
Percent Contamination: _____

Method of disposal of spent solvent: Freon evaporates and the chlorothene-contaminated rags are drummed.

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Freon 114	NA	Degreaser	16 gallons	NA	55 gallon drum
Freon 113	NA	Degreaser	18 gallons	NA	55 gallon drum
Chlorothene	NA	Solvent	0.5 gallon	NA	55 gallon drum

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? Materials are obtained through SAC cards. SAC cards are an in-house inventory system.

How often are materials re-stocked? as needed

Water Use NA

Process Stream	Quantity Used/Month	Use	Cost
Input	not applicable		
Outflow			
Recycle			

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Disposal Cost
Halogenated Solvents	negligible	Degreasers	Drummed	--

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents Chemical	Major Constituents Concentration
Halogenated Solvents	solid (rags)	Chlorothene	NA
		Freon	NA

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

Has an analysis of the waste been done? Yes
If, so can we get a copy? Yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

Wastes are drummed, segregated and collected at various designated locations within Grumman.

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? as needed

What is the procedure for arranging for pickup? Testing Department calls facilities when enough waste is generated.

Are wastes segregated? Yes

(6) Emissions Not applicable

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Is solvent recovery practiced? NA

If yes, what method:

Carbon adsorption _____
Condensation _____
Distillation _____
Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: **Solvent-contaminated rags are drummed and sent to be reclaimed.**

Considered successful? X yes ___ no

If yes, why? **Rags are reused.**

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Research and Development

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/15/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789
Paul Brown	Building Manager	NA

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Research and Development Plant. The Thermodynamics Department is testing various products. There is no other information available since access to the building was denied.

Measure of output for this process: _____

Dimensions of operating area: Width _____
Length _____
Height _____

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartlucci CONSULTING ENGINEERS

G1129G/B

WASTE REDUCTION QUESTIONNAIRE

Process/Operation: Warehouse

Audit Team: Pat Behling
Kathleen Gallagher

Date: 5/15/91

Contacts

Name	Position	Phone #
Bill Barnes	Environmental Engineer	(516) 575-6789

(1) Background

Facility-Specific Information

Brief description of the activities conducted at this facility:
Grumman Aerospace Corporation is a major defense contractor engaged in the manufacture of aircraft parts and subassemblies.

Process/Operation Specific Data [for targeted process within the facility]

Brief description of process: Store chemicals and mix paints for use in various plants.

Measure of output for this process: _____

Dimensions of operating area:

Width	100'
Length	200'
Height	20'

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartlucci CONSULTING ENGINEERS

Sketch of Process Area

No process diagrams for this operation.

Are engineering design drawings available? If so, obtain copies.

(2) **Labor Requirements**

Number of workers: 4

Specify number of workers by process step, if possible: one worker

Operations data: Number of days/year as needed and hours/day as needed of operation.

(3) **Equipment Requirements**

Is all work done manually? No

If not, describe system used: There are electronic mixers that mix the paints and sealants.

Identify major equipment [e.g., by use, size, manufacturer, efficiencies, controls (e.g., temperature and pressure), age, etc.--dependent on process]

Procedure for cleaning equipment: After each batch mixing the equipment is cleaned using toluene.

Solvents(s) used: toluene
Quantity: as needed
Percent Contamination: _____

Method of disposal of spent solvent: Toluene and toluene-contaminated rags are drummed.

Source: New York State Waste Reduction Guidance Manual

(4) Materials Information

Raw Materials Usage

Type	Product Name/ Manufacturer	Use	Quantity Used/Month	Cost	Size of Supply Containers[1]
Toluene	NA	Cleaner	NA	NA	1 gallon container

Material specifications [for primary materials specified above]

Weight	NA	Color	NA
Heat Resistance	NA	Weight	NA
Density	NA	Corrosion Resistance	NA
Other	NA		

Where are materials purchased? NA
Contact Name:
Phone Number:

What is the normal procedure for ordering materials? All chemical materials ordered throughout the plant is stored in Warehouse .

How often are materials re-stocked? as needed

Water Use

Process Stream	Quantity Used/Month	Use	Cost
Input	NA		
Outflow			
Recycle			

[1] i.e., bulk, 55-gallon drums, etc.

Source: New York State Waste Reduction Guidance Manual

Dvirka and Bartilucci CONSULTING ENGINEERS

Energy Use

Type [fuel/source]	Quantity Used/Month	Use	Cost
[electric]	not available		
[gas]			
[oil]			

(5) Waste Generation

Waste Stream Identification

Waste Stream	Quantity Generated Per Month	Process Source	Disposal Method	Cost
Paint Cans	negligible	Paint mixing	Drummed	--
Nonhalogenated Solvent	negligible	Cleaner	Drummed	--

Waste Stream Characterization

Waste Stream	Physical Form (liquid, solid, or sludge)	Major Constituents	
		Chemical	Concentration
Empty Paint Cans	solid	Various Paints	--
Nonhalogenated Solvent	solid (rags)	Toluene	NA

Source: New York State Waste Reduction Guidance Manual

Has an analysis of the waste been done? Yes
If, so can we get a copy? Yes
Contact name: _____
Phone #: _____

Sketch of Waste Storage Area
(Note size and numbers of different containers)

What group/department is responsible for picking up wastes? Facilities

Contact Name: Barry Andres
Phone Number: (516) 575-3599

How often are wastes picked up? as needed

What is the procedure for arranging for pickup? Warehouse stores drums of empty paint cans and solvent contaminated rags until Facilities Department is called directly for pick-up.

Are wastes segregated? Yes

(6) Emissions - Information not available at this time.

Average Emissions

Substance	Quantity/yr	Source of Estimate

Has an air permit application been filed?
Person responsible:
Phone #:
Is a copy available?

Ventilation
Flow rate: (ft/min)
Height of vent stack: (ft)

Source: New York State Waste Reduction Guidance Manual

Ventilation

Air Filters #	Air Filters Locations	Exhaust Filters #	Exhaust Filters Locations	Fans #	Fans Locations	Fans hp

Is solvent recovery practiced? **No**

If yes, what method:
- Carbon adsorption _____
- Condensation _____
- Distillation _____
- Other _____

(7) Other Waste Reduction Information

Previous waste reduction efforts for this operation? X yes ___ no

If yes, approach used: **Solvent-contaminated rags are sent off-site to be reclaimed.**

Considered successful? X yes ___ no

If yes, why? **Rags can be reused.**

If no, why not?

What is seen as the main operating constraint?

Are there any flow diagrams, specifications, etc that may be helpful?

Source: New York State Waste Reduction Guidance Manual

Appendix C

APPENDIX C

OPTION GENERATION FORMS

OPTION GENERATION

Meeting format (e.g., brainstorming, nominal group technique) Group Technique

Meeting Coordinator Ray Huntington

Meeting Participants Various Grumman Aerospace Corporation Personnel from the Materials & Processing and Environmental Divisions

List Suggested Options	Rationale/Remarks on Option
1. Provide coolant substitute for machining processes	1. Reduce generation of chlorofluorocarbon waste
2. Phase out machining processes	2. Reduce generation of chlorofluorocarbon waste
3. Prohibit new machining processes requiring chlorofluorocarbons	3. Avoid generation of additional chlorofluorocarbon waste
4. Provide substitute for chlorofluorocarbons used in cleaning areas	4. Reduce generation of chlorofluorocarbon waste
5. Modify cleaning fluid application equipment	5. Reduce generation of chlorofluorocarbon waste
6. Provide alternate cleaning method in lieu of vapor degrease options	6. Reduce use of trichloroethylene
7. Provide substitute paint	7. Reduce use of various hazardous chemicals used as paint supplements
8. Provide airtight containers for spent cleaning rags	8. Reduce vaporization of hazardous chemicals to atmosphere
9. Provide substitute paint cleaning solvent	9. Reduce use of hazardous chemicals as paint solvents
10. Reclaim paint cleaning solvent	10. Reduce use of hazardous chemicals as paint solvents
11. Provide substitute chemical in lieu of chrome compounds	11. Reduce use of chrome compounds in anodizing and deoxidation processes
12. Utilize plastic media blasting (paint stripping modification)	12. Reduce use of methylene chloride as paint stripper
13. Upgrade holding tanks	13. Reduce vaporization of freon to atmosphere by upgrading holding tanks
14. Improve inventory control	14. Reduce wasting and misuse of hazardous chemicals through close monitoring of their use
15. Provide employee training	15. Heighten employee awareness and educate them on methods to help the effort
16. Property development and reorganization	16. Eliminate and reorganize certain operations reducing hazardous chemical usage through more efficient process layout

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION GENERATION

Meeting format (e.g., brainstorming, nominal group technique) Group Technique

Meeting Coordinator Ray Huntington

Meeting Participants Various Grumman Aerospace Corporation Personnel from the Materials & Processing and Environmental Divisions

List Suggested Options	Rationale/Remarks on Option
17. Utilize starch polymer blasting (paint stripping modification)	17. Reduce use of methylene chloride as paint stripper
18. Reclaim trichloroethylene	18. Reduce use of trichloroethylene
19. Revise procedure for final cleaning of various sub-assemblies	19. Reduce use of various hazardous solvents
20. Improve hazardous material storage facilities	20. Reduce contamination of hazardous chemicals
21. Segregate wastes	21. Reduce hazardous waste generation by segregating nonhazardous waste
22. Revise hydrofluoric acid bath operations	22. Reduce hydrofluoric acid solution waste
23. Provide for caustic solution reclamation	23. Reduce caustic solution waste

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

Appendix D

APPENDIX D

OPTION DESCRIPTION FORMS

OPTION DESCRIPTION

Option Name: Provide Coolant Substitute for Machining Processes

Briefly describe the option Reduce the use of chlorofluorocarbons as coolants in machining processes through replacement with a substitute, nonhazardous, coolant.

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon, Genesolv

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- ___ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- _X_ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site

___ Material reused for original purpose
___ Material used for a lower-quality purpose
___ Material sold
___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991
Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Phase Out Machining Processes

Briefly describe the option Phase out existing machining processes which use chlorofluorocarbons as coolants in order to reduce the use of these coolants

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon, Genesolv

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991
Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Prohibit New Machining Processes Requiring Chlorofluorocarbons

Briefly describe the option Establish a moratorium on new applications in the machining processing areas which utilize chlorofluorocarbons as coolants.

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon, Genesolv

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991

Approved for study? X yes ___ no, by: GAC and D&B

Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Substitute for Chlorofluorocarbons used in Cleaning Areas

Briefly describe the option Utilize a substitute cleaning fluid in lieu of existing chlorofluorocarbons use. The goal is to reduce the use of chlorofluorocarbons and the generation of chlorofluorocarbon waste.

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon, Genesolv

Product(s) Affected: None

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - ___ Personnel/Procedure-Related Change
  - _X_ Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991

Approved for study? X yes _____ no, by: GAC and D&B

Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Modify Cleaning Fluid Application Equipment

Briefly describe the option Modify application equipment used to apply cleaning fluid in order to provide for frugal use of the fluid and minimize chlorofluorocarbons waste.

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon, Genesolv

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- _X_ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991
Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Alternate Cleaning Method in Lieu of Vapor Degrease Operations.

Briefly describe the option Reduce the use of trichloroethylene in vapor degrease operations by using an alternate cleaning method. Cleaning method will most likely utilize a water base cleaner. Incorporated with this option will be the reduction of oil contaminants on the parts requiring cleaning such as preservative oils and oils used in forming operations.

Waste Stream(s) Affected: Trichloroethylene

Input Materials(s) Affected: Trichloroethylene

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991
Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Substitute Paint

Briefly describe the option Reduce the use of hazardous chemicals as paint thinners and supplements by changing to a different type of paint that would not require hazardous chemicals.

Waste Stream(s) Affected: Methyl Chloroform, Toluene, Methyl Ethyl Ketone, Xylene and Chromium Compounds

Input Materials(s) Affected: Methyl Chloroform, Toluene, Methyl Ethyl Ketone, Xylene and Chromium Compounds

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- ___ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- X Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991
Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Airtight Containers for Spent Cleaning Rags

Briefly describe the option Provide air tight containers for storing spent cleaning rags saturated with cleaning fluids in order to reduce vaporization of hazardous chemicals to the atmosphere.

Waste Stream(s) Affected: Methyl Ethyl Ketone and Methyl Chloroform

Input Materials(s) Affected: Methyl Ethyl Ketone and Methyl Chloroform

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- _X_ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Substitute Paint Cleaning Solvent

Briefly describe the option Provide a substitute cleaning solvent in lieu of currently used hazardous solvents. Substitute may be enzyme or alcohol based. This option will reduce or eliminate hazardous solvent use.

Waste Stream(s) Affected: Methyl Chloroform and Methyl Ethyl Ketone

Input Materials(s) Affected: Methyl Chloroform and Methyl Ethyl Ketone

Product(s) Affected:

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - ___ Personnel/Procedure-Related Change
  - X Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Reclaim Paint Cleaning Solvent

Briefly describe the option Reduce waste of hazardous chemical solvents used in paint cleaning through reclamation and reuse. Reclamation may be accomplished through carbon adsorption or a condensation system.

Waste Stream(s) Affected: Methyl Chloroform and Methyl Ethyl Ketone

Input Materials(s) Affected: Methyl Chloroform and Methyl Ethyl Ketone

Product(s) Affected: None

Indicate Type:

☐ Source Reduction
- ___ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

☒ Recycling/Reuse
- X On-site
- ___ Off-site

- X Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Substitute Chemical in Lieu of Chrome Compounds

Briefly describe the option Chrome compounds are currently used in aluminum anodizing and deoxidation processes. The goal of this option is to reduce the use of these compounds by substituting alternate, nonhazardous, chemicals which can provide similar treatment.

Waste Stream(s) Affected: Chrome compounds

Input Materials(s) Affected: Chrome compounds

Product(s) Affected: None

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - ___ Personnel/Procedure-Related Change
  - _X_ Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Utilize Plastic Media Blasting (Paint Stripping Modification)

Briefly describe the option Modify paint stripping operation. Current operation utilizes large quantities of methylene chloride. Plastic media blasting can be used in lieu of chemical stripping.

Waste Stream(s) Affected: Methylene Chloride

Input Materials(s) Affected: Methylene Chloride

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Upgrade Holding Tanks

Briefly describe the option Upgrade Freon holding tanks to reduce vaporization and leakage.

Waste Stream(s) Affected: Chlorofluorocarbons

Input Materials(s) Affected: Freon

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

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EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Improve Inventory Control

Briefly describe the option A system for closely controlling distribution and use of hazardous chemicals could be implemented to reduce wasting and misuse of the chemicals.

Waste Stream(s) Affected: Toluene, Methyl Isobutyl Ketone, Xylene, Chlorofluorocarbons, Perchloroethylene, Trichloroethylene, Methyl Chloroform, Methylene Chloride, Chromium Compounds, Methyl Ethyl Ketone.

Input Materials(s) Affected: Toluene, Methyl Isobutyl Ketone, Xylene, Chlorofluorocarbons, Perchloroethylene, Trichloroethylene, Methyl Chloroform, Methylene Chloride, Chromium Compounds, Methyl Ethyl Ketone.

Product(s) Affected: None

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - _X_ Personnel/Procedure-Related Change
  - ___ Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide Employee Training

Briefly describe the option: Provide training seminars and information booklets to materials and processing and supervisory personnel to heighten awareness to waste minimization efforts and to educate them on ways to help the effort.

Waste Stream(s) Affected: All hazardous waste streams

Input Materials(s) Affected: All hazardous materials

Product(s) Affected: _____

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - X Personnel/Procedure-Related Change
  - ___ Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

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Approved for study? X yes _____ no, by: GAC and D&B

Reason for Acceptance or Rejection: Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Property Development and Reorganization

Briefly describe the option As a result of changes in manufacturing priorities, Grumman Aerospace Corporation is currently reorganizing property at the Bethpage Facility, which, when completed may result in a reduction of a number of hazardous waste streams. In addition, planned property development may eliminate several sources of hazardous waste.

Waste Stream(s) Affected: All hazardous waste streams

Input Materials(s) Affected: All hazardous materials

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- _X_ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Starch Polymer Blasting (Paint Stripping Modification)

Briefly describe the option Modify paint stripping operation. Current operation utilizes large quantities of methylene chloride. Starch Polymer blasting can be used in lieu of chemicals stripping. Environmentally safe starch pellets strip paint when blasted onto painted surface.

Waste Stream(s) Affected: Methylene Chloride

Input Materials(s) Affected: Methylene Chloride

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- [X] Equipment-Related Change
- [ ] Personnel/Procedure-Related Change
- [ ] Materials-Related Change

[ ] Recycling/Reuse
- [ ] On-site
- [ ] Off-site
- [ ] Material reused for original purpose
- [ ] Material used for a lower-quality purpose
- [ ] Material sold
- [ ] Material burned for heat recovery

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Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Trichloroethylene Reclamation

Briefly describe the option Send spent trichloroethylene, from vapor degreasing of hydraulic lines, to an off-site facility for reclamation and reuse.

Waste Stream(s) Affected: Trichloroethylene

Input Materials(s) Affected: Trichloroethylene

Product(s) Affected: None

Indicate Type:

☐ Source Reduction
- ___ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

☒ Recycling/Reuse
- ___ On-site
- X Off-site

___ Material reused for original purpose
___ Material used for a lower-quality purpose
___ Material sold
___ Material burned for heat recovery
X Material processed for reuse

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Approved for study? X yes ___ no, by: GAC and D&B
Reason for Acceptance or Rejection Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Revise Procedure for Final Cleaning of various subassemblies

Briefly describe the option Wipe or dip subassemblies instead of spraying solvent in order to reduce use of hazardous solvent.

Waste Stream(s) Affected: Trichloroethane, Chlorothane, Isopropyl Alcohol, Lacquer thinner, Freon.

Input Materials(s) Affected: Trichloroethane, Chlorothane, Isopropyl Alcohol, Lacquer thinner, Freon.

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- ___ Equipment-Related Change
- _X_ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

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EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Improve Hazardous Material Storage Facilities

Briefly describe the option Provide secondary containment for all virgin hazardous materials including provision for indoor storage in order to avoid container corrosion and physical damage which may reduce contamination of the material.

Waste Stream(s) Affected: All hazardous waste streams

Input Materials(s) Affected: All hazardous chemicals

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- [X] Equipment-Related Change
- [ ] Personnel/Procedure-Related Change
- [ ] Materials-Related Change

[ ] Recycling/Reuse
- [ ] On-site
- [ ] Off-site
- [ ] Material reused for original purpose
- [ ] Material used for a lower-quality purpose
- [ ] Material sold
- [ ] Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991
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Reason for Acceptance or Rejection Potential for significant reduction

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EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Segregate Wastes

Briefly describe the option: Reduce the amount of oil and water and solvent waste by segregating out potentially nonhazardous material.

Waste Stream(s) Affected: Oil and water waste, Methyl Ethyl Ketone, Toluene, Methylene Chloride

Input Materials(s) Affected: None

Product(s) Affected: None

Indicate Type:

- [X] Source Reduction
  - ___ Equipment-Related Change
  - _X_ Personnel/Procedure-Related Change
  - ___ Materials-Related Change
- [ ] Recycling/Reuse
  - ___ On-site
  - ___ Off-site
  - ___ Material reused for original purpose
  - ___ Material used for a lower-quality purpose
  - ___ Material sold
  - ___ Material burned for heat recovery

Originally proposed by: Grumman Aerospace Corp. (GAC) Date: April 1991

Reviewed by: Dvirka and Bartilucci (D&B) Date: June 1991

Approved for study? _X_ yes _____ no, by: GAC and D&B

Reason for Acceptance or Rejection: Potential for significant reduction

Source: Waste Minimization Opportunity Assessment Manual
EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Revise Hydrofluoric Acid Bath Operations

Briefly describe the option Reduce hydrofluoric acid solution waste through reduction in solution "drag out" and chemical loss from solutions in process tanks. Slower removal and tank covers are being considered.

Waste Stream(s) Affected: Hydrofluoric Acid Solution

Input Materials(s) Affected: Hydrofluoric Acid

Product(s) Affected: None

Indicate Type:

[X] Source Reduction
- X Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

[ ] Recycling/Reuse
- ___ On-site
- ___ Off-site
- ___ Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

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EPA/625/7-88/003

OPTION DESCRIPTION

Option Name: Provide for Caustic Solution Reclamation

Briefly describe the option Reclaim spent caustic solution for reuse. Grumman is currently awaiting Navy funding for this planned option.

Waste Stream(s) Affected: Caustic Solution

Input Materials(s) Affected: Sodium Hydroxide

Product(s) Affected: None

Indicate Type:

☐ Source Reduction
- ___ Equipment-Related Change
- ___ Personnel/Procedure-Related Change
- ___ Materials-Related Change

☒ Recycling/Reuse
- X On-site
- ___ Off-site

- X Material reused for original purpose
- ___ Material used for a lower-quality purpose
- ___ Material sold
- ___ Material burned for heat recovery

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